THE BREEDING & MANAGEMENT OF DRAUGHT HORSES

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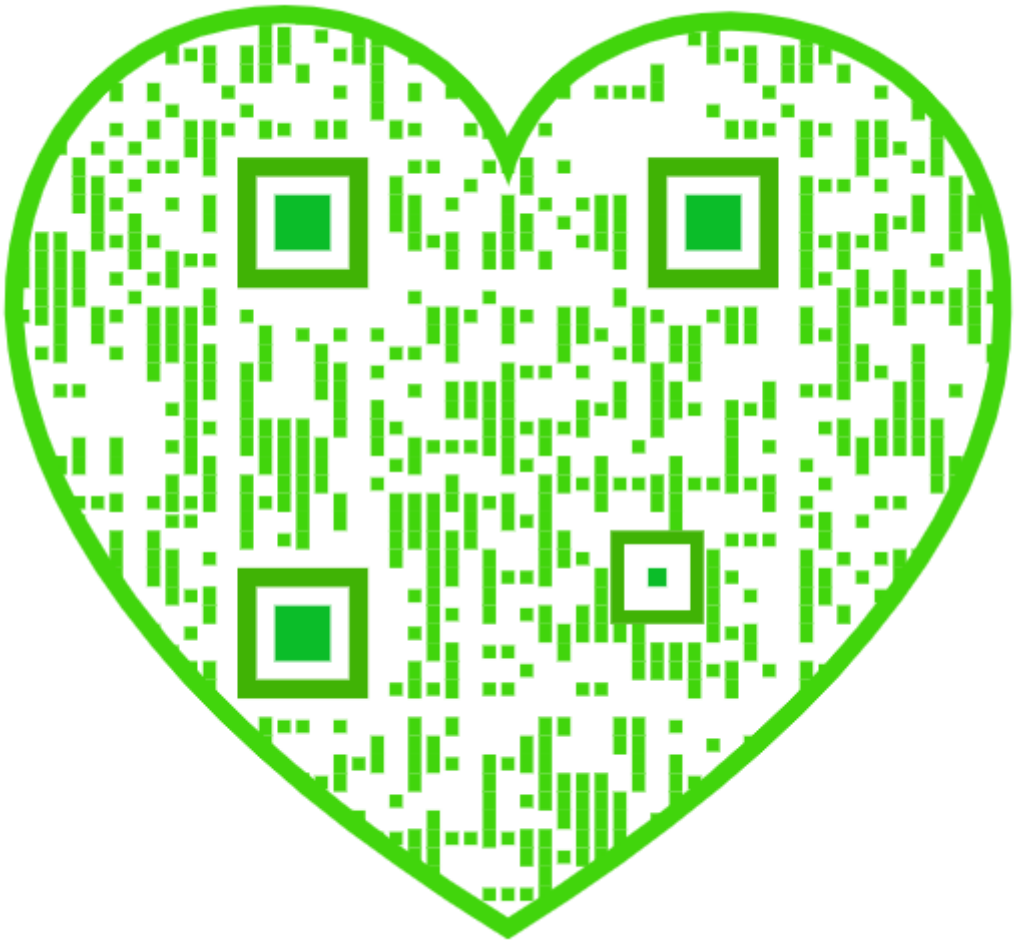

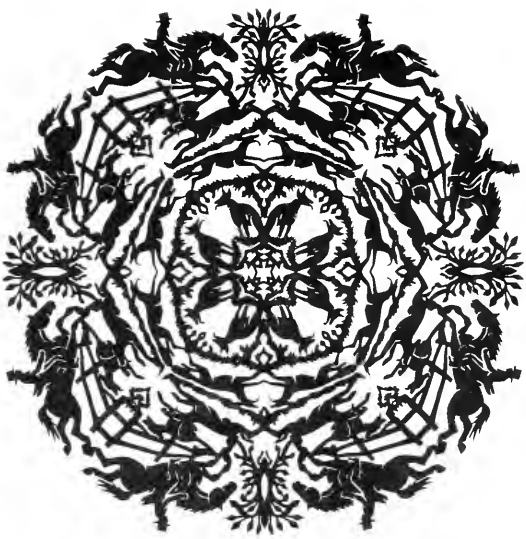

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OF

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AN ESSAY

ON THE

BREEDING AND MANAGEMENT

OF

DRAUGHT HORSES.

BY

RICHARD S. REYNOLDS, M.R.C.V.S.,

LIVERPOOL.

LONDON:

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PREFACE.

WITH the exception of such Essays as have from time to time been written for Agricultural and other Societies whose objects are essentially devoted to the breeding and rearing of animals as products of husbandry, the Author is not aware that any work upon the general management of draught horses with especial reference to their use in cities and towns has been published.

A consideration of this fact, together with a full appreciation of the enormous pecuniary value represented by the magnificent studs owned by the public corporations, carrying companies, and private firms of the United Kingdom, is the Author's apology for giving effect to an expressed desire that his Essay on 'The Breeding and Management of Cart Horses' (which the Council of the English Cart Horse Society published in the second volume of their Stud Book) should be revised and enlarged to meet the requirements of owners of horses used for the purpose of heavy draught.

To Mr. J. T. Wood, the Chief Superintendent of the Sewerage Department of this City, the Author is greatly indebted for many valuable practical suggestions upon the construction and drainage of town stables, and more especially for his cordial co-operation, extending over a period of several years, in conducting experi-

mental inquiries into the various methods adopted for securing a free and perfect interchange of air, investigations which have abundantly proved that the majority of processes now in use are not only opposed to the correct principles of ventilation, but that they are defective or useless, not to say absolutely pernicious in operation.

LIVERPOOL,
July, 1882.

THE

BREEDING AND MANAGEMENT

OF

DRAUGHT HORSES.

SECTION I.—ON BREEDING.

General Remarks.

NOTWITHSTANDING the English farmer's instinctive love for horses and horse-craft, it cannot be denied that he has devoted infinitely less intelligence and attention to the breeding and rearing of draught horses than to the perfecting of any other kind of domestic animal.

Compared with the growth of grain, and the production of animal food, it is true that the profits resulting from breeding and rearing cart horses have not always been sufficiently certain nor sufficiently great to encourage a practice for the successful accomplishment of which neither money nor ability must be wanting. But now that steam-ships have bridged, as it were, the Atlantic Ocean, bringing the surplus food-products of the American continent into direct competition with our home productions, the time has arrived for the British yeoman to direct attention to those branches of his calling which may have been hitherto neglected.

I cannot but look upon the breeding of draught horses as a neglected source of profit. Really good animals of this class are comparatively few, and at all times have commanded remunerative

prices; they were never less common in this country than they now are, and for many years to come they will assuredly maintain a high value.

The demand for an article is the natural stimulus for its production. If there are any exceptions to this law of political economy, they are not to be found in reference to a required multiplication of any breed of domesticated animals. Yet the supply of high-class draught horses must of necessity remain deficient for a long period, for since the demand created for horses of all descriptions a few years ago, when trade was abnormally inflated, many persons have been persuaded to sell their good mares; those who yielded to the temptation of realizing a high figure have before now bitterly repented 'Killing the goose that laid the golden eggs.' That bad horses, the results of ill-assorted mating, or the progeny of unsound and defective parents, are generally a drug in the market, is not a fair argument to be employed against the practice of sound breeding, but a knowledge of that fact should rather be an incentive for the employment of intelligence, care, and a reasonable amount of capital, by means of which draught-horse breeders may achieve more excellent results, and thus secure a fair profit for the risks they incur and the money they embark.

Many disheartening failures in attempts at horse-rearing are attributable to mistakes engendered through ignorance of the science of breeding and of the principles of hygiene which influence the growth and development of young horses, without a knowledge of which it is impossible for any person to achieve permanent success. Before attempting to breed draught horses on an extensive scale, the farmer must consider whether his surroundings will permit him to entertain a hope of success in the undertaking. He must duly estimate the fertility of his land, the influences of climate, the risks, and other elements of the problem, the solution of which will vary in each individual case; and he must then judge what particular stamp of horse he can raise with the greatest advantage, paying due regard to convenience in the conduct of his ordinary farming operations, as well as the ultimate

and direct pecuniary benefit to be derived by the sale of his foals and young horses.

The best thanks of cart-horse breeders are due to the Editor of the *Mark Lane Express*, who published, in his issue of October 31st, 1881, a very valuable summary of the respective qualifications of the different breeds of heavy horses for work on paved roads. The table is compiled from returns furnished by some of the largest cart-horse proprietors in the kingdom, and is, in many ways, most instructive, especially so in affording to breeders reliable information as to what the requirements of team-owners are. It shows what an enormous demand for draught horses is created by the wear and tear of town work, and also that there is little fear of foreign competition by the importation of continental horses, at least so long as the supply of home-bred animals is equal to the demand. If the statements relating to van-work, which is usually performed at a trot (by a class of horses raised to maturity on light-soil farms), are eliminated from the table, the evidence is uniformly favourable to the employment of heavy-boned horses. Amongst the contributors of the returns opinions differ somewhat as to the superiority of clean-legged as opposed to hairy-legged horses. From personal observation I am led to think that the remarks of some contributors who condemn hairy-legged horses are intended to express disapproval of an excessively coarse growth, springing from an equally coarse skin, rather than to the possession of that amount of silky hair which almost always garnishes the legs of an animal having bone enough to merit the title of a dray horse. If it is desired to breed van horses, hair may be advantageously dispensed with; but I hold a very strong opinion that it is impossible to breed for several generations horses possessing sufficient bone to fit them for the purposes of heavy draught, from animals which have not a considerable amount of long hair upon their legs.

Inducements for Breeding Draught Horses of High Class.

Beyond the absolute profit the English farmer may expect to realize by the sale of his horses, there are several auxiliary

encouragements offered to him for the production of high-class animals which it will be well to review briefly.

The Royal Agricultural Society, and a large number of local kindred associations, whose essential object is the improvement of farm stock, annually devote considerable sums of money for distribution amongst owners of the best horses competing in various and defined classes.

Previous to the year 1863, the Royal Society's draught-horse prizes were not separated into classes for each of the three breeds of agricultural horses acknowledged to possess individual distinction. Since that time the Society has wisely adopted special classification for Clydesdales and Suffolks, a division which might with great advantage be extended to the other historical draught horse, the 'Old English Shire,' the benefactor if not the ancestor of both the other races, and which breed is now consigned to undignified acknowledgment in classes vaguely appropriated for 'Horses not qualified to compete as Clydesdales or Suffolks.'

The influence of agricultural exhibitions has an effect beyond the money value of the offered prizes: they excite emulation in proprietors, and afford an opportunity for the general public to appreciate excellence in, and to perfect their judgment of, the exhibits, and they tend to increase the national wealth of the country by augmenting the individual worth of the prize-winners beyond their intrinsic value as horses. Notwithstanding these patent advantages, there are attendant evils (especially applicable to draught horses) resulting rather from defects in the administration of the exhibitions than from the shows themselves.

In the first place, there are noblemen, gentlemen, and stud companies, who spare neither first cost nor subsequent expense in preparation in order to secure the honour of winning the offered prizes, often sweeping all before them in local competitions. The fear of meeting the representatives of this class of exhibitors frequently deters men more humbly circumstanced from entering their animals. It is true that the competition in the classes to which I refer is generally not limited to locality; but it is not a wise policy (except for 'Stallion Classes,' and even in them the

awards should be conditional) to allow the money collected in a district for the purpose of encouraging local excellence to be taken away by animals kept, in all probability, for the especial purpose of prize-winning.

Secondly: It has been elsewhere* suggested that the wording of the prize schedules of the Royal and some other Agricultural Societies is detrimental to the production of high-class cart horses. It must be admitted that judges justify their awards to light-limbed, showy animals exhibited in 'Agricultural Horse Classes,' by the plea that such are suitable for agricultural purposes. Horses possessing excellent 'top,' but having legs deficient in bone and hair, will not for a considerable period be as highly appreciated as those possessing the essential qualifications of a cart horse; for so strong is the tendency of the present breed to procreate 'weeds,' that, in defiance of every effort to obtain strong-limbed colts, the production of light-legged animals is the rule rather than the exception.

Thirdly: The practice becoming more common of giving prizes to yearlings and two and three year old colts is, in my opinion, very prejudicial to the perfection of the adult animal.

It is natural that judges should award prizes to the best developed and most matured colts offered to their inspection, forgetful for the moment that early maturity in young horses is simply an evidence of over-feeding, whereby predisposition to disease, debility of constitution, and premature decay, are engendered. Early maturity in horses is not conducive to real excellence, for inasmuch as there appears to be a natural law that rapid development to perfection bears an inverse ratio to the duration of mature existence, it follows that any attempt at infraction or abridgment of such a decree must necessarily be followed by undesirable results.

Fourthly: The condition in which horses of all ages are usually brought into the show-ring is discreditable to the intelligence of the exhibitors, and an outrage upon the animals. The accumulation of useless fat, without which it is ignorantly considered no

* *Field*, January 25, 1879.

animal can be in 'show condition,' proves that activity, beauty of limb, physical strength, capacity for endurance, constitution, and every other attribute desirable in a horse, has been sacrificed for a development not only unprofitable but absolutely pernicious. Early susceptibility to accumulate fat, and succulent flesh, has been attained in Shorthorns and Southdowns with a reasonable object, but at the expense of some robustness and vigour; the senseless exhibition of horses, however, in fat-stock condition cannot be justified by even one single argument in its favour. Quite the reverse; the tendency to accumulate fat in early life should be the last thing to strive for in an animal whose destiny is work, or the procreation of useful descendants.

It is not my province to point out remedies for this great evil, but I would suggest to those extensive exhibitors who are successful under the present system to adopt the plan of exhibiting their horses in the condition which common sense indicates as the best suited for the preservation of their health and future service, and trust to the perspicacity of the judges to discover real merit where it exists.

The breeder of cart horses may hope to occasionally possess a colt fitted to be retained for stud purposes, and so be enabled to compete for the liberal subsidies now offered by associations formed to guarantee a highly remunerative payment for the services of a stallion to mares belonging to the associated members. Within the past three years a powerful stimulus to breed draught horses of exceptionally high class has been created by the demand for such animals in the American and Canadian markets. Buyers from the Western Continent are daily becoming more alive to the superiority of the English Shire horse. For many years the breeders of Clydesdales enjoyed almost a monopoly in the exportation of cart stallions and mares, and I have reason to think that purchasers were greatly influenced in the preference they gave to the North-country horse by the fact that he possessed a distinctive name, and consequently it was inferred that his pedigree must necessarily be of greater purity than that of an animal not generally known by a more definite title than that of

'The English Cart Horse;' but the efforts of the English Cart Horse Society, and the influence of their annual exhibition of pedigree horses, have already done so much to establish the right of the English horse to recognition as one of specific and particular breed, that it may be safely anticipated that in the immediate future, buyers for the foreign markets will almost uniformly pronounce in favour of the 'Shire horse.'

The Science and Practice of Breeding.

The limits of an essay embracing, as this is intended to do, several distinct subjects, will not permit an elaborate and lengthy dissertation upon the science of breeding, but some of the more important features established as axioms of the practice must be adverted to.

The Influence of Parents.—Of all the means available for effecting an improvement in any race of domesticated animals breeding is the most powerful. The general influence of parents upon their progeny is, that the latter invariably inherit a modification of the forms and qualities of the former. Nor is it necessary for transmission to offspring that any especial form or quality possessed by a parent should have been by him or her inherited; an improvement once established in an individual, whether by inheritance or as a result of special management, is susceptible of transmission to succeeding generations, and by careful and intelligent attention to the selection of future partners for the offspring, the alteration may be fixed and become a typical character of an improved race.

It must never be forgotten that not only are superior forms and attributes transmitted from parent to progeny, but that defects, malformations, and unsoundness, or the predispositions thereto, seem to enjoy an especial privilege of re-appearing in succeeding generations.

Some persons regard the qualities and defects of breeding animals in a relative, as well as an absolute sense; for instance, they agree that a malformed chest, or mis-shapen limb, are defects absolute, but assert that flat feet are only positively defective when possessed by a stallion intended to be put to a mare

having similar feet; and further, that such faults are to be considered rather as desirable qualifications in the partner of an upright-footed mare. Personally I can admit of no such qualification, and believe it folly to expect that the mating of two animals, each having opposite defects of any kind, can result in anything but disappointment. Imperfections of conformation, constitution, or temper, cannot be so corrected, but are to be very gradually improved by careful attention to the selection of partners possessing perfect organization, to oppose defects, and still more by the employment of well-directed external means calculated to ameliorate the particular fault.

Physical and intellectual faculties to be permanent must have been fixed by transmission from parent to progeny, through a series of generations. Recently acquired qualities are ephemeral; they are transmitted with difficulty, and destroyed by slight opposing causes. Peculiarities of form, size, colour and constitution, with qualities, vices, and defects of all kinds, descend from remote generations, and it is not rare to observe in a foal distinctive characteristics identical with those possessed by grandsire or grandam, though absent in its proximate parents.

In-and-In Breeding.—Consanguineous unions, amongst mankind as offensive to morality and law as they are disastrous in results, do not appear to be so contrary to the natural decrees which govern the *liaisons* of the brute creation. In-and-in breeding, instead of favouring progressive degeneration, has been practised with eminently successful results, for the establishment and conservation of new and improved breeds of domesticated animals. Its utility is very marked in cases where certain especial qualities are possessed by but few individuals, and attained by them perhaps in an unknown manner. The practice, however, should never be adopted carelessly, nor except in necessary and particular cases; for when prosecuted to any considerable extent in animals having a family defect, most unsatisfactory results are likely to follow; predisposition to even very trivial imperfections of form or health becomes so intensified in the offspring of consanguineous unions, that many successive generations of the

alliance may be afflicted with an inheritance of deformity or disease.

'Crossing.'—Another method employed for the improvement of a breed is that of 'crossing,' or the alliance of reproductors of different races, in order to give what may be considered a desirable alteration in succeeding generations. With a view to the production of animals adapted for a specific purpose, it is evident that the offspring of a cross alliance will inherit qualities superior to one parent and inferior to the other; it is therefore necessary for the breeder, before he adopts a practice so influential in its consequences, to duly consider what qualifications he desires to obtain, and fully estimate the probable effects of an infusion of extraneous blood. The evils resulting from a careless system of 'crossing' the Shire horse of thirty or forty years ago with lighter breeds are now practically apparent in the majority of cart horses, and reformation by long-continued and above all intelligent selection of stud animals, can alone re-establish the grand bone and hair formerly possessed by the old English horse.

Special Influence of Sire and Dam.—The especial influence of sire or dam upon the product of conception varies in accord with sex, age, constitution, and breed of the individuals. Many persons assert that the stallion transmits conformation of the fore-hand and extremities, strength, energy, and capacity for work; and that the mare communicates height, volume of the trunk, and the posterior conformation; but every person of experience knows that there are numberless exceptions to the above rule—if it can be so designated—and in my individual experience I have found that the more purely and highly-bred one parent is, as compared with the other, the product of conception will invariably favour the best-descended animal, whether it be sire or dam.

The offspring of equally well-bred parents will more closely resemble the ancestor nearest in age to the prime of life, and possessing the most vigorous constitution. In the absence of

influencing conditions the progeny, if a colt, will favour the stallion; if a filly, the mare.

Special Influence of the Stallion.—That the influence of the sire in the reproductive act does not terminate with the birth of the first offspring is proved by frequent facts in dog-breeding, and in more than one instance in the mare; hence arises the great importance of fillies being served by a good sound, well-coloured horse.

It is obviously of greater importance for the conservation of any particular type that the males should be more representative than the females, for whilst a mare produces one foal only in a year, a stallion may be the sire of seventy or eighty colts annually.

The alliance of a stallion and a mare should be subordinated to the rules fixed by experience, in reference to their respective conformation, size, age, and individual aptitudes. In order to produce increased height of the foal, many persons (G. Collin amongst the number) advocate the employment of a stallion whose size surpasses that of the mare; others adopt the opinion of Cline, that the stallion should be smaller than the mare. Three of the best cart geldings I ever saw, all exceeding $16\frac{1}{2}$ hands high, were bred from a little Welsh mare, barely $15\frac{1}{4}$ hands high; and, as a rule, it will be found that a well-proportioned stallion, of commanding size, begets from low, wide mares a better class of foals than when the relative proportions are reversed.

Choice of Horse and Mare for Breeding.

From the resemblance that offspring bear to their parents results the necessity for choice in the selection of animals for breeding purposes, an important consideration too frequently neglected by the breeders of draught horses.

Both mare and stallion should possess qualities desired to be obtained in the progeny; if those qualities are possessed only by one parent, it should be by the one most likely to transmit them; both also should be free from deformity, defects of temper, or predisposition to disease.

Whilst it is essential for good reproductors to possess equal and

well-proportioned exteriors, indicative of well-developed organs and regions, which contribute to the production of physical force, it is not equally necessary that they should present that full and graceful contour so pleasing to the eye.

Primary attention must be given to capacity of chest, full development in this respect being usually associated with a wide lower jaw, massive forehead, and capacious nostrils. The ribs should be well rounded and deep, withers thick and strong,* shoulders massive, and well thrown outwards to afford ample space for the collar; eyes large, clear, full, and expressive of docility and intelligence; ears well formed and mobile; the loins short, wide, and level with the croup, which should be long; the thighs well let down, and furnished, like the reins and buttocks, with large and firm muscular developments; the fore-arm and second thighs constituted of distinct and very tense muscle; the knees and hocks large, well defined, and possessing great mobility; tendons and ligaments thick, and equal throughout their length; pasterns broad and strong, but of greater length and more obliquely placed than is usual amongst the prize animals of the present day; the feet strong, hard, neither too flat nor too upright, and in size proportionate to the bulk of the animal; canons, fore and hind, short, measuring not less than 11 inches in circumference immediately below the knee, and garnished with a plentiful growth of silky hair. With regard to position, the limbs should be so placed that each extremity and each bone thereof supports its due proportion of weight.

Age of Animals for Breeding.

Subject to the influences of very early precocity, or contraction of disease, the age at which draught stallions and mares may be

* Many good judges insist that a cart horse should possess very sloping shoulders. Whilst admitting the necessity of such a conformation for good saddle and light harness horses, and appreciating its beauty in heavy animals, I am decidedly opposed to the opinion, on the ground that such form is almost invariably associated with thin withers and shoulder-blades closely applied to the front ribs, affording an insufficient and insecure seat for the collar, and, consequently, one very defective for the purposes of heavy draught.

employed for breeding purposes are prescribed only by the natural development and decline of procreative power, but the periods of life when they may be profitably used are more limited.

Condition of Stud Animals.

Moderate condition, attained by good food associated with regular and sufficient labour, is desirable in breeding animals. Excessive leanness implies irritability of temper, or the existence of some disease, whilst a disposition to accumulate fat indicates a soft lymphatic temperament, both of which extremes are unfavourable for the best fulfilment of the procreative functions. Other qualifications, action, courage, vigour, capacity for work, intelligence, and obedience, are also desirable in stud animals.

Choice of a Stallion.

In the selection of a stallion, it is not wise to attach as much importance to the animal himself as to the quality of his stock (that is, of course, if he is old enough to have offspring to be judged), and, whenever it is intended to employ one on an extensive scale, his merits as a good reproductor in all respects should be previously ascertained.

Prolific Powers of Stallions.

It is difficult to estimate the prolific force of a stallion without experience of his individual capabilities; it is usual to fix the number of mares in regard to his age and value. In justice to the owner of the mare the limit ought to be governed by reason; as a rule, the number of mares assigned to one horse in this country is excessive. From the following table of statistics relating to the royal stud-horses of France,* it appears that the fecundative power of a stallion is rather increased than diminished by moderate use. The best results of the services of these stallions must, however, be considered very unfavourable; the

* Eug. Gayot, 'Dict. de Méd. Vét.,' tome vi. p. 419.

proportion of foals should be nearly 70, and certainly not below 50 per cent.

Years.	Average number of Mares assigned to each Stallion.	Percentage of Foals.
1830 to 1840	32	28¼
1840 to 1845	42	39
1846 to 1851	49	47½ in 1848 48¾ in 1849 49¾ in 1850 50¼ in 1851

It is common to allow two-year-old colts to be extensively used, but the most considerate owners limit the number of their services for the first and second seasons. The excessive use of young stallions is detrimental to their development, and the effect upon their hind legs is often disastrous. The stimulating diet to which they are treated also tends to debilitate their constitutions, and lay the foundation of irremediable diseases.

Many instances are recorded of the procreative power being retained by stallions to very advanced age. Aristotle cites one case of a horse begetting foals at forty years old. Mr. Street states that Mr. Nix's 'Captain' served mares for nearly thirty years,* and numerous instance are known of horses twenty years old and upwards, amongst them Wiseman's 'Wonder,' not only serving mares successfully, but travelling whole seasons on wide circuits. Entire horses, which have not been forced by strong food, and have been but moderately used up to five years old, remain sound and vigorous to a good old age; and to a sound, hardy stallion of from seven to fifteen, or even more, years, possessing suitable qualifications, let me commend those breeders who desire good, strong, and healthy foals.

Management of the Stallion.

A practice much adopted on the Continent, of allowing the mare to be covered twice within a comparatively brief period, has

* 'Live Stock Journal Almanack, 1879.'

much to recommend it, but with travelling stallions it is attended with inconvenience. The custom accords with that pursued by animals permitted by unrestraint to indulge their natural desires, and is especially favourable for the impregnation of ardent and excitable mares: the first essay, having the effect of calming the energy and excessive irritability of the generative organs, renders conception by a second service of greater probability. To the adoption of this practice, most stallion proprietors raise objections beyond that of inconvenience, and do not appear to understand that, if attended with successful results, it is better for the horse to serve the mare twice in one day than to cover her, if refractory, four, five, or even more times, at intervals of several days. In domestication, gregarious animals rarely evince antipathies to those of the opposite sex when in 'heat.' Sometimes, however, a stallion, especially a young and over-used one, is insensible to the attractions of a mare, and more markedly so if she is suckling at the time. When an antipathy of this kind obstructs what appears to the owner of the mare a desirable alliance, the practice is adopted of exciting the horse by the approach of another mare, and, at the moment of service, substituting the one it is wished should be covered. The deception often proves effectual, but its frequent repetition has the almost certain effect of rendering a docile horse savage and ill-tempered.

Work.—As the procreative power of a stallion is increased by the establishment of condition, and as condition results from the association of good food and sufficient exercise, it is apparent that entire horses must be benefited by moderate labour, a proposition substantiated by general admission that working stallions beget more foals than those whose systems have been pampered by over-feeding and insufficient exercise. During the seasons travelling stallions cannot, of course, be put to team labour, but they should have sufficient daily exercise to maintain their muscles of locomotion in vigour, to create a natural appetite for food, and to receive the full benefits of pure air and change of scene.

Out of season the influence of a moderate amount of draught work is, in every particular but one, beneficial; the exception

being that after long-continued collar-work, entire horses never regain that noble and elastic deportment so noticeable in an unworked horse.

Few farmers have convenience for turning out their stallions in the late summer and early autumn, a practice which should always be adopted when opportunity affords. Even if regularly worked on the farm, entire horses are always better turned into a straw yard with an open hovel during autumn and winter, than subjected to closer confinement.

Food.—During the season stallions should be well and substantially dieted, nor should their condition be too much reduced in the other months of the year. At the same time, every tendency to obesity must be checked by restriction in the quantity, and especially in the quality, of the food supply, combined with the exaction of severe exercise, or, still better, by the imposition of a fair amount of labour. No uniform ration can be assigned for a stallion; each will require in this respect especial treatment, to correspond with the amount of work, individual robustness, age, and tendency to accumulate fat. The quality of the articles of diet should be the best procurable. As to kind, oats and hay form by far the best provender; but in season an auxiliary allowance of beans and peas is highly beneficial for entire horses which have attained the age of five years. The supply of leguminous seeds to younger entire horses living in stables is attended with danger, and is not required if the amount of their work is duly proportioned to their age.

Out of season beans should be promptly and entirely discontinued, and the allowance of oats reduced. The substitution of boiled barley for all or part of the oat ration is a salutary and agreeable change.

Whenever good grass or tares are obtainable, they should be given. At other times pulped roots and chop must constitute a large proportion of the daily food. Upon no account should wheat be given, in or out of season; its otherwise good stimulative properties are overbalanced by the predisposition it founds to attacks of laminitis, and other congestive diseases. Many persons

have a particular inclination for physicking their stallions with all sorts of glandular excitants—a most reprehensible practice, which sooner or later must result in producing debility of the organs repeatedly stimulated. Healthy animals require no medicine; condition in them may be established and maintained by intelligently-applied alterations in the quantity and quality of their food and labour. To check a tendency to plethora, an occasional dose of cathartic medicine is beneficial, but its action must be rationally supplemented by dietetic and hygienic adjuncts. The administration of aphrodisiac agents, too frequently employed by ignorant horse leaders unknown to their masters, should be most severely discountenanced.

Choice of a Mare.

Due allowance being made for the differences in natural conformation presented by the females as compared with the males of the equine species, the brood mare should possess all the qualifications previously stated to be desiderata in both sexes. The body of the mare should be generally longer, the head, neck, and fore-hand less massive, the croup and thighs larger, and the abdomen and pelvis relatively more capacious than corresponding regions of the stallion.

The generative organs and mammary glands should be well d e veloped, and free from blemish or indications of disease.

Mares conceive from the age of two years to advanced life. Many have been known to breed up to twenty-five, but beyond the age of fifteen or sixteen years even in the most robust the procreative powers decrease, conception becomes uncertain, and their foals are generally small and weakly. As an instance of procreative power almost unparalleled, it is recorded that the great grandam of Massey's 'Mansetta'* (a stallion foaled in 1813) was barren twice only in twenty seasons.

Fillies served at two years old, and so coming into profit as reproductors at three, will rarely develop into very high-class animals, and when it is considered advisable to breed from them

* English Cart Horse Stud Book, 1479.

thus early they should not be subjected to work beyond that required to break them in, until their first foals are two months old. The best age to put a mare to the horse is at three years old, so that when she is sold in the autumn of her seventh year, the owner will probably have obtained two foals, the value of which, added to the earnings of the mare as a team animal, will leave her full sale price to represent the proprietor's profit. Subject to the influences previously considered, the alliance of strong young mares with aged and robust stallions is the most certain method of obtaining a yearly production of good foals. Mares that have been worked up to ten or twelve years old in towns, and acquired at that age for breeding purposes, seldom fulfil the desires of the purchaser; by the maintenance of high condition for a prolonged period they are rendered prone to sterility, and if fecundated, they are apt to experience difficulties in labour. When moderately well nourished, comfortably lodged, and unfatigued by excessive and long-continued labour, mares are apt to breed at all seasons of the year, thereby affording the owner an opportunity to secure the dropping of his foals at a time when the exigencies of team labour are not very pressing, and when a fresh and abundant supply of green food can be assured for the mutual benefit of the mare and offspring. Mares regularly worked, or those having to seek their food in the spring from poor pastures, are much more certainly fecundated than their idle or stable-fed sisters supplied with rich and abundant provender.

Œstrum.

The appearances of that physiological condition termed 'œstrum,' 'heat,' 'in use,' etc., are usually manifested in the mare by general signs, and by particular phenomena presented by the generative organs.

The intensity of the objective signs varies very much in different individuals; in some, all the symptoms are evinced by inappetence, increased thirst, agitation, impatience, frequent neighing, and efforts to urinate; the vulvæ are swollen—the lining membrane reddened, and a white glairy discharge issues

therefrom ; in others, no signs are recognisable by which the condition of 'heat' can be inferred. Its presence is not apparent until the mare is 'tried' by a stallion.

Conception.

The most opportune time for a matron mare to be again served is the ninth day after foaling ; for subsequent proof that she has conceived, the twentieth or twenty-first day after service is usually selected. Many usages are still had recourse to in the endeavour to insure conception by mares that have previously shown an indisposition to be fecundated, but the barbarous customs much practised in former years by ignorant persons for the attainment of that object are now happily becoming of less frequent occurrence.

Acting upon the knowledge that exercise has the effect of provoking the evacuation of the excreta, and also of rendering petulant females more tranquil, the Arabs gallop their mares to excess, and submit them to the stallion fatigued and inclined for rest. The most novel practice in this respect is the administration of about two-thirds of a pint of vinegar to the mare immediately after service. I have no experience of this mode of treatment, and I fail to see any physiological reason why it should be successful. Complaints of the infecundity of a stallion are ever frequent, and often so when the cause is entirely due to the unfit state in which the mare is presented ; unless she is served at the moment in the plenitude of heat, her owner should attach no blame to the horse if the essay proves unfruitful. The abstraction of blood has in some cases been followed by successful results ; but the most rational practice that can be adopted is to reduce the condition of mares, refractory to conception, by submitting them to a prolonged course of cooling diet, of which corn should form no constituent, and, after completion of the act, to leave them in a state of perfect quietude for several hours.

Biennial Breeding.

In some countries it is the custom for owners of brood mares to have them covered biennially, in the expectation of obtaining

stronger and better-developed foals. In England, however, such a course is unnecessary and unprofitable, as it is always desirable for mares to be supplied with auxiliary food support during the period of lactation, and when the foals are weaned, as they should be at five or six months old, the fœtus *in utero* has not become sufficiently developed to create an inordinate drain upon the mare's nutritive functions. The profit of yearly foal-bearing is not only as a rule greater, but also more certain; for it is a recog nised fact, though subject to exceptions, that those mares which are annually served become more surely fecundated than those covered every alternate year. In this respect, as in many others, the owner must exercise his discretion, and be guided by the circumstances peculiar to his individual situation: if the demands for team work upon the farm are likely to render it impracticable for him to allow the rest needful for the well-being of all his mares when it is required, it will be better to adopt the biennial system, and employ only half his mares as breeders at one time; but under most other circumstances the annual method will be more advantageous and profitable.

Sterility.

Sterility in the mare may be due to age or prolonged continence, especially where associated with high condition; or it may arise from abnormal conformation, or diseases of the womb, or the existence of painful wounds, or diseases of the feet: it is, however, usually induced in mares prone to accumulate fat, by a superabundant supply of highly-stimulating food and the absence of sufficient work.

Medicinal treatment or surgical operations in some rare cases may cure sterility arising from a suspension of the uterine functions, or abnormalities of the organ; and the operation of neurotomy has been adopted with success upon mares rendered sterile by acutely painful foot diseases. The treatment for over-plethoric mares must be that of reduction to low, or even poor condition.

Gestation.

With the exception that the venereal excitement usually diminishes or disappears, and the animal becomes lazy and quiet,

the signs that a mare has been impregnated do not become apparent for some time, nor is the periodical re-appearance of 'heat' to be regarded as a conclusive evidence of non-conception. It is not impossible for œstrum to co-exist with impregnation. The inconstancy in appearance of the objective symptoms of pregnancy renders that condition problematical (especially in mares, which ordinarily show only slight appearances of 'œstrum') until the sixth or seventh month, when the fœtal movements may usually be discerned in the flank, unless manual exploration of the uterus by vaginal examination is adopted for the purpose of ascertaining whether conception has taken place.

Valuable as the operation is for determining the state of the uterus during the primary months of gestation, it should never be employed except in cases of urgent necessity, on account of the danger and possible death of the fœtus, which may be apprehended to follow its adoption with an irritable mare.

The period of gestation in the mare occupies, as a rule, from 330 to 360 days, during nearly the whole of which time it is of great importance that opportunity is afforded for a sufficiency of daily exercise, especially needful for mares which are not suckling a foal.

Work.—When intelligently organized, in regard to the different periods of gestation, ordinary farm-work is exceedingly beneficial to both mare and fœtus. Throughout the whole period it is better that the labour should be continued and uniform, than violent or irregular. Shafting heavy loads, especially when much backing or turning is required, should not be permitted. Towards the end of pregnacy all work necessitating unequal movements, or even excessive effort, should be discontinued, and with the appearance of the signs that parturition may be expected to take place within a week or ten days, it is advisable, but not essential, that work should be entirely suspended. Pregnant mares should be stabled with due regard to security against annoyance, compression, or injury by other horses, and especially guarded against the accident of being 'cast' in their stalls. Medical or surgical treatment

should, as far as possible, be avoided; when absolutely necessary, the utmost possible care in its administration is required.

Food.—The food and feeding of mares-in-foal are of great and important interest, the science and practice whereof must be carefully studied by breeders who would be successful in maintaining their mares healthy throughout the period of gestation, and over the act of foaling, and reap the reward of stout and vigorous foals. The quantity and nutritive quality of provender supplied to a pregnant mare should be in strict accord with her individual requirements; the establishment of a just balance between food and the demand for it can be determined by an accurate perception of condition, as exemplified by the possession of vigour and evidences of efficient nutrition.

The two opposite extremes of obesity or plethora and excessive leanness or debility are to be avoided; the former predisposes to abortion and difficult labours, the latter (of the two the least evil) prejudicially influences the nutrition of the fœtus, and deteriorates the subsequent secretion of milk. Grass unaided by artificial food is insufficient for the sustenance of breeding mares subjected to labour; to insure the yearly production of strong foals a daily allowance of corn should be continuously supplied, but, except in the depth of winter, or for very young or very aged mares, green food, chop, and pulped roots suffice for the requirements of non-workers.

Most farmers usually feed their pregnant mares, when not suckling, on the same ration as that supplied to the other working horses. With good keepers the practice suffices to maintain adequate condition, but when the ordinary provender is of low quality the mares should receive an auxiliary allowance.

Mashes or bruised oats or barley associated with pulped roots and chopped hay or straw, moistened with linseed-cake water, are the best adapted foods for working mares-in-foal—so constituted, they afford a substantial and at the same time a non-exciting and easily assimilated diet. Maize is not a suitable grain for in-foal mares; when it constitutes a chief part of their corn allowance, their newly dropped progeny always exhibit

general weakness of muscle and abnormal relaxation of the ligaments of the joints.

For mares pastured during the day a short supply of rack or manger food given in early morning renders their digestive organs less susceptible to the possibly deleterious influences of dew-saturated grass. More than any other farm animals, brood mares require to be supplied with diet of the best obtainable quality; every description likely to undergo rapid fermentation, or to produce indigestion, must be scrupulously avoided. Long fasts are exceedingly prejudicial, and in cases where they are unavoidable or have been occasioned through neglect, small quantities of tepid water, and diminished rations of easily digestible food, should only be allowed at intervals, until the hunger and thirst have been reduced to their normal standards.

Pregnant mares should not be exposed to the influences of very excessive heat, or very severe cold, nor be pastured or folded with store oxen or young horses.

Abortion.

Abortion is produced by any cause operating to disconnect the fœtal membranes from the uterus. These causes are very various, and may obtain at all periods of pregnancy. Predisposition to abortion is to be found in peculiar conformations of the pelvis, enlargements of the iliac bones, diseases of the womb, constitutional irritability, the influences of too stimulative diet or the reverse, wet seasons, a previous miscarriage, and all circumstances opposed to efficient nutrition and respiration.

The more direct mechanical causes are falls, blows, compressions of the abdomen, violent and spasmodic exertion. Functional disorders, severe illnesses, large draughts of cold water, or eating iced grass, may be considered as the most frequent physiological causes.

The symptoms of abortion vary with the term of gestation at which it occurs. When it follows shortly after conception, the precursory signs, as well as the occurrence of the fact, are frequently unnoticed, and the proprietor is led to believe that the

mare has not been fecundated; on the other hand, when miscarriage takes place towards the end of the gestative period, the premonitory symptoms are almost identical with the signs of normal parturition, but the pains of abortion invariably precede the changes in the appearance of the external organs of generation, which in normal foaling are noticeable some time before the labour-pains come on. The usual signs of the fœtus being dead, and not expelled immediately afterwards, are symptoms of ill-health in the mare, accompanied by an offensive discharge from the vulvæ.

The prevention of abortion is the avoidance of all causes which may have a tendency to produce it. In advanced pregnancy, when a symptom of approaching miscarriage has been manifested, the greatest care in the subsequent management of the mare is necessary. She should be placed in a roomy, darkened loose-box, left perfectly unmolested, and the services of an experienced veterinary surgeon immediately sought. Whenever a mare has 'picked her foal,' the cause should, if possible, be determined, and means adopted to prevent other pregnant mares being exposed to similar conditions. They should also be removed to a distance from the place, on account of the mysterious sympathetic influence exercised upon the organism of pregnant animals by the mere occurrence of abortion in one of their companions. The attention required by a mare after abortion materially depends upon the indications of her general health. It very frequently happens that the placental membranes are retained in the uterus; these should be removed before decomposition of their component parts is possible, and the mare should not be covered again until every appearance due to the mishap has entirely subsided.

Parturition.

The characteristic signs that the gestative period has been fully and naturally completed, and that parturition may be shortly expected to take place, are very pronounced, and so familiar to all persons who have had any experience in the management of brood mares that they need not be enumerated.

The natural instinctive desire for shade and solitude expe-

rienced by the mare at this crisis should be indulged by placing her in a warm, roomy, and well-littered loose-box, so arranged that the progress she makes can be constantly ascertained without causing her annoyance by interruption. Normal parturition in the mare is very rapid; at her full time, and with the fœtus naturally placed, the act is generally accomplished in a short space of time, and without assistance.

The sense of uneasiness created by the presence of the fully-developed fœtus determines contraction of the abdominal muscles and diaphragm, as well as the walls of the womb itself; at the same time the orifice of the latter organ becomes dilated, succeeding efforts of expulsion push the muzzle and fore feet of the fœtus further through the neck of the uterus, in which situation they may be recognised, immersed in the fluids of the yet unruptured membranes. More violent pains then force the head and shoulders through the pelvis, and another last contraction expels the posterior parts and completes the act.

If the labour is protracted and the pains are very strong, a quiet and careful examination should be made, for the purpose of ascertaining whether there is sufficient room for the fœtus to pass through the pelvic arch, and also to determine whether the foal occupies a natural position. In the first case more time may be allowed, in the second the fœtus will require to be adjusted. To judge accurately of either of these conditions the attendant must be an experienced man, and know the exact time when interference is necessary. Very great harm is occasioned by premature and unnecessary meddling. He should make re-examinations from time to time, and if increased room is but tardily provided, he must take care, by securing the parts presented, that the fœtal position does not become changed from a natural to a mal-presentation through the continued and violent throes of the mare. Dilatation of the passage may be assisted by gentle and well-applied traction upon those portions of the fœtus that are naturally presented. The causes of difficult labour, and the means to be adopted to overcome obstructions to delivery, with the treatment of the patient after parturition, are so numerous,

and belong so intrinsically to the science of veterinary surgery, that they have no place here. Whenever serious obstacles to delivery exist, the aid of an experienced veterinary obstetrician should be promptly sought, and no violent tractile efforts employed until his arrival; but if the membranes are ruptured, as they probably will be before it is considered necessary to obtain skilled aid, it is wise to secure with cords the head or legs of the foal when easily practicable. It sometimes happens, especially with old and debilitated mares, that the act of parturition becomes protracted from weakness alone. Such cases not only demand the administration of powerful internal stimulants, but require the employment of well-timed, gentle, and firm traction upon the fœtus coinciding with the throes of the mare: spasmodic, jerking efforts, which do not correspond with the parturient pains, in all cases do much harm, and are of little or no assistance to the act.

After an easy labour strong mares require nothing but attention to their comfort and ordinary wants, and protection from currents of cold air; but if the *accouchement* has been prolonged and painful a stimulant should be immediately given: debilitated mares under the last-named circumstance require frequent alcoholic stimulants, nourishing gruel, and good nursing.

The fœtal envelopes, or after-birth, are usually expelled in a short time after natural labour; when retained for a day or two no danger need be apprehended, so long as the mare does not strain, and her health continues unimpaired; but surgical interference for their removal becomes necessary when retained sufficiently long to render putrefaction probable.

Aged mares, having very large and pendulous abdomens, derive much comfort from a wide bandage passed several times round the body, adjusted evenly, and with a view of affording support without exerting undue pressure.

After-pains continued for more than an hour are to be regarded as evidence of possibly some important derangement of the womb, and requiring skilled aid. The application of a mustard and linseed poultice over the region of the loins is always consistent

treatment in these cases, and may be adopted at once, to economise valuable time before the arrival of the veterinary surgeon.

When a mare foals in a standing position, the fœtus glides down the thighs, and reaches the ground unhurt; the umbilical cord is severed, and dangerous hæmorrhage thereby prevented. When the act is accomplished in a recumbent attitude, and the mare remains down, the cord must be divided between two ligatures previously tied round it a couple of inches apart; but if the mare rises immediately the cord will be ruptured in a safe and satisfactory manner.

Many foals are lost through want of attention at the moment of birth. When the functions of respiration are not promptly established in the new-born foal, efforts must be made to excite them by blowing violently upon the muzzle and into the mouth, and by briskly rubbing the body with a wisp. If breathing is but slowly promoted a few tea-spoonfuls of brandy and water, given after the first few respirations, will be of material service to invigorate the low vital powers.

As soon as the mare has recovered from the shock, the maternal instinct should be encouraged by allowing her to perform the office of nurse to her progeny, which will be physically benefited thereby. If the dam refuses to dry and caress her offspring, a little flour sprinkled over the back of the latter will sometimes attract her kindly to it; should this means fail, the foal must be dried with soft flannel, conducted to the teat, and assisted to obtain its first aliment.

It is sometimes necessary to protect the foal from the ill-intention of a peevish dam; but after the mare has permitted the foal to suck, and has evinced maternal solicitude for its welfare by licking and caressing it, no fear need be entertained that she will subsequently injure it wilfully.

Treatment of the Mare after Foaling.

All the means briefly reviewed as necessary for the preservation of the newly-born foal and for the comfort of the mare, are to be

continued for a period more or less prolonged, as their conditions and surrounding circumstances indicate. If both mare and foal are healthy, and especially if the mare has been pastured up to the time of foaling, they will be benefited by being turned to grass during fine weather, in a week or two after the birth; but they must be sheltered from rain and cold, particularly at night, and so long as the weather continues unfavourable.

At this early period the mare should never be permitted to graze until she has had a small allowance of sweet hay, or some other nutritious dry food, nor should she be subjected to work for at least three weeks after parturition. Some mares, especially with their first foal, do not furnish sufficient milk for the sustenance of the offspring. In these cases the mammary glands must be frequently stimulated by the foal, and subsequently submitted to gentle friction, and a supply of succulent easily digestible food allowed. In the absence of a plentiful supply of grass, boiled barley made into a sloppy mash, with the addition of some treacle and a little salt, is a palatable, nourishing diet, tending to increase the lacteal secretion. If these means fail to excite a sufficient flow of milk, the foal must be periodically suckled by a foster-mare, or be artificially nourished. Should the season not admit of mares being pastured, barley mashes, pulped roots, scalded oats and hay, of the best procurable quality, should be liberally supplied. A plentiful allowance of water, or, for bad milking mares, nutritious gruel, is necessary.

Most mares, however, secrete a plentiful, and many a superabundant supply of milk. Such do not require, soon after foaling, a more liberal allowance of food than they previously received. The provision of rich herbage suffices for their general requirements. In early life, too, foals are prone to contract dangerous diseases of the digestive organs, and on that account it is undesirable that they should be allowed, until several days old, to take the whole milk supply of a free-nourishing or well-fed dam. Under such circumstances the foal should not have access to the mare until part of the contents of the udder has been drawn off. After some days, when the foal has become stronger, the above

precautions are unnecessary. A more liberal allowance of food may then be supplied, to be regulated by the demands made upon her nutritive functions by the increasing strength of the foal, and the wear and tear of the labour to which she may be subjected.

In districts where the mare is not required to work until the foal is weaned, grass suffices for all her requirements. The best old pastures should, however, be reserved for her use. When these cease to afford sufficient green food by reason of drought or overstocking, the deficiency must be made up by an allowance of cut artificial grasses, lucerne or clover, given with discretion.

If at any time during the period of lactation the udder becomes inflamed, hot, or tense, the diet must be promptly reduced, the milk reservoirs very frequently emptied, and warm fomentations adopted, to be followed by very gentle friction with soap and water (greasy substances ought not to be rubbed upon the glands). If the foal is dead, or can conveniently be weaned, a dose of physic may be administered to the mare. Under such circumstances it may be necessary to put the mare under medical treatment of a less drastic character.

Treatment of the Mare when the Foal is Weaned.

The usual time for weaning is when the foal has arrived at the age of five or six months, when, if the mare has re-conceived, or has been, or is about to be, severely worked, it is for her benefit that the separation should not be longer delayed.

If the milk secretion is not excessive, no danger need be apprehended from the process of weaning, which it is desirable in all cases to effect gradually. On the contrary, the separation of the foals from free-nourishing mares must be accomplished by degrees. For some days prior to final removal of the foal, the intervals of allowing him to suck must be increased in length, and the food-allowance of the mare reduced in quantity and quality for a corresponding time.

If practicable also the mare should be more severely worked. After ultimate severance of the foal, the glands must be periodically hand-drawn, and a brisk purgative administered. Restricted

diet, particularly in regard to fluid and succulent provender, should be enjoined until the secretion of milk is completely suspended. Mares kept only for breeding purposes, if in good condition and not enfeebled by age or other circumstances, may continue to nourish their foals for a much longer period—until, in fact, a natural weaning takes place, and the milk secretion ceases. The weaning of foals from mares not subjected to labour and furnishing a full lacteal secretion must be accomplished with the exercise of all the hygienic and medicinal precautions previously indicated, and rendered especially necessary by abstinence from work.

SECTION II.—ON REARING.

General Remarks.

It would perhaps have been more convenient to discuss that section of rearing embraced within the periods of the foal's birth to its separation from the dam concurrently with the management of the mare after parturition, but the measures needful for the conservation of the young foal's health and vigour cannot be too forcibly expressed, and on that account I prefer to repeat what may have been previously written rather than fail to bring them prominently under notice.

In rearing young horses the chief objects to be attained are, natural growth of the bony and muscular structures, full development of the respiratory organs, general strength of constitution, and good sound feet. Within the limits of individual capacity the whole of these desiderata are to be obtained by a proper supply of well-chosen food, sufficient exercise, and attention to hygienic principles.

When very young, all animals are more susceptible to the influence of external conditions than at any other period of their existence. The epoch of foalage is consequently one at which it

is most easy to modify and improve the physical features of the horse-to-be.

In very early life, when the animal frame is in process of rapid growth, all parts of the body increase and develop simultaneously. It is then that foals require to be supplied with good and suitable food, and assisted by treatment calculated to promote health and vigour, in order that they may acquire equal and more perfect conformation. On the other hand, when foals and young horses have been starved and ill fed until they have reached three or four years old, no amount of good feeding and attention can produce any appreciable augmentation in their bony structures, viscera, tendons, or muscles. After that age a plentiful allowance of rich aliment can only contribute to the production of an excess of fat, fluids, and soft tissues.

During Lactation.

Throughout the period of lactation, and very especially during that portion of it when the foal receives the whole of its sustenance from the dam, it is requisite for the mare to be supplied with good food calculated to furnish material for the elaboration of wholesome milk.

The first milk after parturition, called 'colostrum,' differs materially in composition from the subsequent secretion. It contains principles adapted to remove the meconium (as the effete matters collected in the foal's intestines during fœtal life are technically termed); on that account it is highly necessary that the newly-born foal should be supplied with the milk from its own dam, at least until the meconium has been expelled and the bowels have assumed their natural function.

Until the approach of the time for weaning, a foal should be permitted to have access to his dam at intervals of not exceeding four hours.

'Heated Milk.'

It is frequently alleged that 'heated milk' is extremely prejudicial to the foal. I admit there is a probability of troublesome

skin disease being caused by allowing a foal to partake of the milk of a mare when she is overheated, but I think the danger of 'heated milk' producing diarrhœa or 'scour' is exaggerated, or, rather, that the evil consequences in this particular respect are as much attributable to the fact that the young animal, pressed by hunger, partakes too greedily and too plentifully, and, as a consequence, is primarily attacked with acute indigestion.

It is always better to be on the safe side, and allow the mare to become cool and to bathe her distended glands with lukewarm water before the foal is admitted to her.

Bad-nourishing Mares.

It is not always that a mare which secretes a copious supply of milk is a good nourisher; some especially old mares, or those subjected to very heavy work and which are inefficiently fed, elaborate a fluid deficient in nutritive quality, a circumstance rendered evident by the condition of the foal, which will become wasted, and may probably be attacked with diarrhœa.

In such cases the mare must be especially well nourished, and, in instances of extreme necessity, the foal assisted by artificial lactation; it should also as soon as possible be encouraged to take manger food, of which boiled beans should constitute the basis, in order that the advantage of an early weaning may be secured.

Constipation.

Notwithstanding the purgative effects of the colostrum, the young foal frequently suffers from constipation of the bowels, and especially so if the dam is, or has been during the latter period of pregnancy, fed with dry or indigestible food, certainly so if the mare has had an acute attack of dyspepsia near the end of the gestative term. Many persons establish the rule that every foal shall have a dose of oil shortly after birth; the practice is generally good—none but beneficial effects are likely to result therefrom, and the life of the foal must be regarded as unsafe until free evacuation of the bowels has been effected. When preceding circumstances have rendered it probable that the foal will be constipated,

the exhibition of a full dose of castor oil is imperatively indicated, and, in addition, frequent enemata of warm soap and water are recommended.

It cannot be expected, nor is it desirable, that the numerous diseases incident to breeding animals of the equine species and their progeny can be even very briefly reviewed in an essay of this kind; the consideration of such a subject properly appertains to veterinary science. There is, however, one malady affecting young foals, which, on account of its frequency and fatality, may be glanced at.

Diarrhœa.

No disease is more prevalent amongst sucking animals, and few are so fatal, as diarrhœa. Although calves are more frequently attacked, foals are often carried off by it within a short space of time. The causes have not been accurately determined, but the most eminent veterinarians attribute it to changes of unknown character in the composition of the milk, the precise nature of which has not yet been ascertained.

Two facts relating thereto have, however, been proved—viz., that the causes are often widely diffused, and secondly, that their potency is increased by defective hygienic surroundings, especially unwholesome stable accommodation and overcrowding of animals. Unless careful treatment is very early adopted, an unfavourable issue is almost certain, and the generally fatal nature of the disease gives little hope of cure when the symptoms have become fully developed. At the outset, a dose of castor oil ought to be given, the action of which is to be followed by repeated small doses of carbonate of iron and carbonate of soda, with laudanum and brandy, given in cold rice-meal gruel. As food, bean-meal made into the consistency of milk, and given at short intervals, is extremely beneficial, and should take the place of a large proportion of the mare's milk. The diet of the mare should be completely changed, and the foal and dam promptly removed to other quarters. As curative treatment is so rarely successful, efforts must be made for preventing the disease. The provision of good, dry, clean

lodgings, pure water, and the occasional administration of alkaline carbonates to the mare, whose diet should be wholesome, and partly composed of leguminous seeds, are the means most likely to be attended with beneficial results.

Nourishing by a Foster Mare.

When, from death of the mare, or other causes, it is not practicable for the newly-born foal to take nourishment from the dam, a foster-mother must be obtained or a process of artificial lactation provided. Some mares are averse to accept other than their own offspring, but if properly managed most of them will adopt a strange progeny. The orphan foal should not be presented to her, until each has need of the other; the young one, pressed by hunger, is ready to afford immediate relief to the mare, who responds by caresses, and thus the desired result is established. The first introduction should be made in a darkened box, and must, of course, be effected under due surveillance, to prevent injury to the foal by the mare showing a repugnance to it. In the absence of a foster-mare, there is little difficulty in persuading a foal to take milk artificially; a greater obstacle is the provision of a diet suited to its powers of digestion.

Artificial Lactation.

The milk of another mare, or of an ass, is, of course, the best; but such are not always obtainable; in default, cow's milk, modified by the addition of water and some sugar, suffices tolerably well. When milk thus prepared does not agree with the foal, an excellent substitute for a portion of it can be obtained by boiling beans deprived of their husk for many hours, subsequently pressing the pulp and fluid through a hair sieve to the consistency of cream.

It is necessary to remember that a dose of castor oil is essential when the foal does not receive the colostrum from its dam; and throughout the whole period of artificial lactation the bowels will from time to time require correction by laxatives, or, when diarrhœa is present, the exhibition of antacids will be indicated.

A bereaved foal in a few weeks will begin to take a small quantity of manger food, which should be very succulent and nutritious, and partly consist of scalded leguminous seeds.

Manger Food for Sucking Foal.

As soon as the foal is capable of masticating corn it should be supplied with a small but progressively increased daily allowance. Crushed scalded oats and beans or peas, made into a mash with bran and linseed-cake water, constitute a most excellent diet. A half-pint of beans to be gradually augmented to a quart per day, supplied before weaning, will be of greater benefit than triple the quantity allowed at two or three years old.

Some persons will no doubt object to beans or peas being used as articles of diet for the rearing of young horses; but as I entertain a very strong opinion that those seeds are better suited than any other grain to the requirements of animals during rapid growth, the reasons why I advocate their use must be submitted.

Without entering into scientific detail, it may be accepted that the chemical composition of leguminous seeds differs from that of cereals in much the same manner as milk differs from flesh. A consideration of this fact first induced me to recommend the use of peas and beans for lamb-rearing. The recommendation has been extensively adopted in some of the midland counties for hoggets and, in a less degree, for foals; and in no instance has the practice failed to substantiate the correctness of the theory: none but good, not to say the best possible, results have been obtained.

At all periods of life salt is an essential constituent of food; between the age of eight weeks and three and a half years, there is a maximum demand for this and other mineral substances to build up the bony frame. Pastures and forages grown with bone manures may be expected to yield in this respect most satisfactory results.

Exercise.

Exercise is as essential for the well-being of a foal as it is for the more mature animal, but should never be carried to an extent sufficient to produce fatigue or promote perspiration.

Weaning.

It has been previously observed that the process of weaning should, as a rule, be accomplished gradually ; a practice equally beneficial for the foal and the mare.

In districts where the breeding of draught horses forms one of the agricultural industries, there is frequently an absence of the necessary accommodation for keeping foals after weaning age, and owners consequently dispose of them to graziers of other localities, who have the convenience for economically rearing them to further maturity. Foals possessing good frames, well-formed feet and limbs, find ready purchasers at the autumnal 'foal fairs.'

The farmer who elects to retain all, or some of his weaners, and the grazier who buys such animals, generally keep them until they are upwards of two years old. The foals are pastured during the spring and summer, and for the first winter, at least, they ought to be fed in straw yards.

Every experienced man will corroborate the force of Captain Heaton's very graphic expression in relation to rearing, that 'the colt should not be allowed to lose his foal's flesh.'

No argument can be advanced in favour of the supposed economy of food privation to foals during their first winter ; by starvation their muscles shrink, their bellies become pendulous, their constitutions weakened, and they are prone to contract organic diseases, and to be infested with destructive parasites.

Although I persistently urge the necessity for the exhibition of good food to foals and young horses, the remarks previously made upon the evils of forced feeding and the promotion of early maturity are in nowise qualified thereby. I strongly desire that the difference between the two conditions should be thoroughly understood and appreciated. By a sufficient, but not superabundant, supply of suitable nutritious food, a regular development of the young animal is to be achieved. This I understand to be *natural growth ;* on the other hand, early maturity, or the premature arrival at the period when *an animal acquires a natural tendency to accumulate fat*, is brought about by excessive feeding

upon diet adapted more for the production of fluids and adipose tissue, than to normal growth of bony and muscular structures.

First Winter.

During the autumn and winter following separation from the mare the foal requires an increased allowance of artificial food, and for three reasons. Firstly, to compensate for the deprivation of its dam's milk; secondly, because autumn grass is much less nutritious than summer herbage; and, thirdly, because under favourable conditions the foal then possesses a greater disposition to equal growth than at any subsequent period.

The demand for increased auxiliary diet will be influenced by many external circumstances, such as the state of the weather, the provision of shelter, the luxuriance of the pasture, etc., but the allowance of artificial food should never be sufficient to render the foal indifferent to exercise, or indisposed to graze.

At this age the quality should be nutritious and moderately succulent; good sweet hay, pulped roots, hay, chaff, oats and beans with bran—the grain always crushed and usually scalded—form the best possible food for foals. Maize, sugar, treacle, malt liquor, or a large allowance of linseed cake, should not be given.

With the advent of cold, foggy autumnal nights, weaning colts should be sheltered in straw yards, and there receive morning and evening their daily ration of artificial food; they cannot sustain, without detriment, the hardships of inclement weather and prolonged exposure. It is, however, highly essential that they should have plenty of exercise, and for that purpose no method is so good as to allow them a daily run of some hours' duration upon a bare winter pasture.

From One to Two Years Old.

At the commencement of the second year, or a little later, it is desirable to separate the sexes, and appoint them to different fields or yards; it is also usual at this time to select from the colts those destined to be reserved as stallions. If the choice is made thus early, the chosen animals should be subjected to more liberal treat-

ment than the remainder; it is the best practice, however, to treat all colts likely to make good stallions equally well until the following spring, in order that the influence of another year's keep in determining superiority of form, action, and physical strength may be estimated.

Castration.

The effect of castration in reference to its action as a modifier of the character is so well known and admitted, that no further consideration is needful, but the influence it exerts upon conformation is not equally well understood.

Many persons advocate the operation for foals of six to nine months old, some defer it until the colts are one year, whilst others prefer the age of two years. It is not wise, however, to fix the period by a prescribed rule, for the results of castration vary according to the age of the animal upon which it is practised. Its influence upon the form of those operated on in early life conduces to increased growth of body, and of those parts of the frame which are by nature more extensively developed in the mare than in the entire horse. The inference to be drawn from a knowledge of this result is, that the time selected for the operation should be subordinated to the physical features of the colt: If possessing as a foal a grand forehead, and comparatively mean hindquarters, castration cannot be performed too early; if, on the other hand, there is ample development of the rear, associated with an imperfect forehead, the colt will profit by a postponement of the operation until he is two years old.

The practice of cutting a low-necked colt, 'proud,' as it is termed, will produce a similar effect; but in my opinion the adoption of the custom I advocate will be attended with more beneficial results, and fewer inconveniences.

The Growth of Yearlings.

Between one and two years old, colts increase less in height than in the first year, but at this time their bodies thicken, and their constitutions are formed; phenomena which will be assisted by a continued supply of good food, less delicate than that previously

required, yet substantial and abundant. Unless they possess very high value, it is asserted that cart colts cannot be economically reared in straw yards. Although it must be admitted that, as a rule, the advantages of an open-air system overbalances those of yard-feeding, the latter method possesses certain features worthy of being noted and of recommendation.

Rearing in Straw Yards.

Colts accustomed to a species of semi-restraint in fold-yards, and brought into closer association with man, from the commencement of their second year become more docile and obedient. The character of the food supplied to them, and the protection afforded against inclement weather, encourages a more complete development of frame, and renders them less susceptible to attacks of parasitic diseases.

In localities where land is very highly rented, and where cheap pasturage is difficult to procure, feeding in straw yards is, I believe, the cheapest practice. It cannot be doubted that colts injure the herbage of their pastures to a greater extent than the grass they actually consume, and that soiling them in summer with cut artificial green food saves a waste of something like fifty per cent. of aliment. But on the other hand, straw-yard reared colts are in after-life generally delicate, and susceptible to the influences of the weather.

When pastured, the hoofs remain firm, the feet wear evenly, and, as a consequence, the extremities retain their normal positions ; but when confined upon a thick bed of littery manure, the horn of the feet grows soft and unduly long, and the limbs become unnaturally disposed.

The basis of winter keep should consist of hay, straw, and pulped roots, with an allowance of corn. Cut grass, clover, or lucerne generally suffices for the summer ration, but it will be found profitable to continue a reduced supply of grain to colts rising two years old. I regard the exaction of daily exercise upon moderately hard ground throughout the year as a necessity for the prevention of undue increase of body, irregularity in the *aplomb* of the limbs, and structural defects of the feet.

Rearing at Pasture.

In localities where land is of low value, or better adapted for grazing than for arable purposes, or when other causes prevail to render straw-yard feeding uneconomical or impracticable, it is necessary that colts should pass both winter and summer in the fields.

During the summer, a good pasture affords, to colts of this age, sufficient nourishment, but the rearers of valuable animals usually, and wisely, allow a supplementary diet of corn to yearlings. Being more robust than weaners, they may remain out later in the autumn, but whenever the growth of grass does not keep pace with the demands for it, a change of management becomes essential; and, in such cases, if the season and circumstances permit, it is well to soil them with artificial grasses.

The occupiers of farms deficient in proportion of pasture, frequently send their colts to 'ley' or 'score' for the summer. The practice is a cheap one, and, in good seasons, the animals usually do well; but even robust yearlings, summered upon the low-lying marshes which border sea-coasts, estuaries, and rivers, never do so well as colts of riper age.

The pasture-ground should be of extensive range, surrounded by good fences, and should afford a sweet and rich, if short, herbage. Upland and hilly pastures, where the air is bracing and the ground dry, are favourable to the preservation of health, and for the conservation of the feet are for 'weaners' and yearlings to be preferred to low-lying lands. The soft marshes and fens of East Anglia, although exceedingly conducive to the production of massive equine development, appear to be better suited to colts of more advanced age. It is of great benefit to run two or several colts together upon a wide range; companionship is highly appreciated by horses of all ages; to colts it is especially an excitant to appetite and exercise.

Land on which horses have been pastured for a number of years in succession, to the entire exclusion of other cattle, and more especially those fields on which colts have been raised, are found to become generally unsuited for this purpose. They fail

to afford a sufficient amount of nutriment, and appear to favour to a dangerous degree the development of internal parasites.

Grass land in such 'horse-sick' condition should be ploughed, and subjected to a thorough course of cropping before it is relaid in grass.

In winter a supply of hay, or straw chaff with corn and pulped roots, is always desirable, and if the ground is frost-bound, or covered with snow, an allowance of dry food is indispensable.

An owner will be amply compensated for the cost of a reasonable amount of corn supplied to his pastured yearlings throughout the winter, by its beneficial effects in building-up better developed frames and increasing their stamina and energy.

One inconvenience of uninterrupted pasturage, which may, however, in a great measure be overcome, is that the colts are difficult to manage when first handled. It is also certain that they more severely experience the loss of their full liberty when permanently stabled.

Rearing at Pasture and in Straw Yards.

In the absence of circumstances rendering such a course impracticable or economical, the best system for rearing colts from one to three years old is by a judicious division of pasturage and straw-yard feeding. When the combined method can be adopted, the young animals are submitted to a regimen cheap and rational. They are permitted to enjoy exercise and liberty in a degree favourable to their growth; are periodically subjected to partial restraint, and are protected from the hardships so detrimental to colts exposed to the severities of winter. When the changes from yard to field, and *vice versâ*, are commenced, they should be gradually effected, and an equality of feeding between the two methods be a chief object. It is a most ill-advised practice to restrict the food allowance of one system, because the lost condition will be quickly regained by the adoption of the other.

Rearing from Two to Three Years Old.

There is not so much necessity for two and three year old unbroken colts as for weaners and yearlings to be supplied with

highly nutritious food, but the allowance should still be maintained substantial in quality and quantity.

There is also less objection to straw-yard feeding at this period than when younger; but the general opinion prevails that until the time has arrived for colts to be put to work, keeping them at pasture is attended with the greatest amount of benefit, and at the above-named ages in favourable summers they thrive remarkably well upon marsh pastures.

When colts have attained the age of about two and a half or three and a half years in the hands of the grazier they are usually offered for sale at fairs, of which Waltham and Rugby are types. To farmers who do not possess the necessary conveniences for bringing up young horses economically, and whose teams must be replenished to fill vacancies created by the sale of five and six year old horses for commercial purposes, these colts, recently taken from rich pastures, at the end of summer are in good condition, and fit for immediate breaking and yoking by their new owners. Some farmers who cannot be designated either breeders or graziers can breed and rear a sufficient number of colts to keep up the numerical strength of their teams, diminishing each year by the sale of mature horses.

The following statements represent the profit which may be expected to accrue from the breeding and rearing of draught horses. Table No. 1 demonstrates the results of breeding from animals of high class, and the rearing off their offspring in such a manner that they will be maintained throughout the whole period of their growth in the best possible condition as growing animals; whilst Table No. 2 represents the consequence of breeding from inferior animals, and the rearing of their progeny by systems of management commonly practised, but not advocated in this essay.

TABLE No. 1.

VALUE OF MARE, **£80.**

	£	s.	d.	£	s.	d.	£	s.	d.
For service to mare	3	3	0						
Add 30 per cent. proportion of unfruitful services	1	1	0						
For loss of mare's work, and extra corn allowance whilst suckling	2	2	0						
1 cental of beans and a little hay for foal	0	10	0						
Add 5 per cent. for loss of foals	0	12	0						
Add 2 per cent. for loss of mares... ...	1	12	0						
Cost of rearing foal to weaning-time							**9**	**0**	**0**
3 centals of beans	1	4	0						
1 ,, oats	0	7	0						
2 ,, bran	0	10	0						
7½ cwt. of hay (best)	1	10	0						
7½ ,, roots	0	7	6						
Cost of winter keep for weaning colt*				3	18	6			
Add 2 per cent. for loss				0	10	0			
							4	8	6
Cost of rearing to one year old ...							**13**	**8**	**6**
20 weeks' grass	3	0	0						
1 cental of beans and oats	0	7	6						
Cost of summer keep for yearling				3	7	6			
11 centals of beans, oats, and maize ...	4	0	0						
2¼ ,, bran	0	11	0						
12 cwt. hay	1	16	0						
16 ,, roots	0	16	0						
Cost of winter keep for yearling*				7	3	0			
Add 2 per cent. for loss				0	14	0			
							11	4	6
Cost of rearing to two years old							**24**	**13**	**0**
20 weeks' grass for summer keep... ..				4	10	0			
22 centals of oats and maize	7	14	0						
2¼ ,, bran	0	11	0						
1 ton of hay	3	0	0						
Cost of winter keep for two years old*				11	5	0			
Add 2 per cent. for loss				1	0	0			
				16	15	0			
Deduct value of work equal to one-half cost of winter keep				5	12	6			
							11	**2**	**6**
Cost of rearing to three years old								**£35**	**15**	**6**

It is assumed that the value of a colt's work from three years old to the time he is sold for commercial purposes will be equal to the cost of his maintenance, and that if he realises **£80** as a town horse, the total nett profit to his breeder and rearer will be about £45.

* The value of grass consumed when at exercise on winter pastures, and of straw eaten in the yards, is not estimated.

TABLE No. 2.

VALUE OF MARE, £45.

	£	s.	d.	£	s.	d.	£	s.	d.
For service to mare...	2	2	0						
Add for unfruitful services	0	14	0						
For loss of mare's work	1	1	0						
Add 5 per cent. for loss of foals	0	8	0						
Add 2 ,, ,, mares... ...	0	18	0						
Cost of rearing foal to weaning-time							5	3	0
Value of pasturage, 32 weeks	2	8	0						
7½ cwt. of hay	1	10	0						
7½ ,, roots	0	7	6						
Cost of winter keep for weaning colt				4	5	6			
Add 2 per cent. for loss				0	7	0			
							4	12	6
Cost of rearing to one year old ...							9	15	6
20 weeks' grass	3	0	0						
12 cwt. of hay	1	16	0						
16 ,. roots	0	16	0						
Add 2 per cent for loss	0	9	0						
							6	1	0
Cost of rearing colt to two years old							15	16	6
22 weeks' grass	4	10	0						
2¼ centals of maize	7	14	0						
20 ,, bran	0	11	0						
1 ton of hay	3	0	0						
				15	15	0			
Add 2 per cent for loss				0	14	0			
				16	9	0			
Deduct value of work equal to one-half cost of winter keep				5	12	6			
							10	16	6
Cost of rearing to three years old							£26	13	0

In this case it is also assumed the colt will earn his keep from three to five or six years old, and that his probable value when disposed of for commercial purposes will not exceed **£50**, and consequently he will realise a profit of about £20 to his owners.

SECTION III.—ON FEEDING.

In the sections of this essay which relate to the rearing of young horses, and the general management of breeding mares and stallions, the necessity for a supply of food proportionate in quan-

tity and quality to the requirements of the individuals and their circumstances has been considered. The equally important element, and one affecting the interests of every horse-owner, is the feeding of animals employed in the general routine of agricultural and commercial operations.

The essential principle of economical horse-feeding consists in the just apportionment of food to the demands created for it by labour, and in the maintenance of health, having due regard to age, condition, season of the year, and robustness. What is a suitable amount of food, and proper amount of work, for one horse, may be either too great or to little for another. Long-continued overwork is most pernicious; its primary influence affects condition, secondarily health is impaired, and, finally, the constitution is ruined. Undue waste of tissue, caused by an inordinate amount of work, cannot be compensated by corresponding excess of food supply. It is quite as reasonable to expect a steam-engine of 10 horse-power to perform the work of one double its strength, by providing fuel and water sufficient for the more powerful one, as it is for a horse to be worked and fed beyond the limits of his power of endurance and capacity to assimilate food. On the other hand, insufficient work, associated with a superabundant supply of rich food, is equally prejudicial to the horse's welfare and his owner's interest, first, by loss in labour through idleness; secondly, by waste of food, through the excess being stored in the form of accumulations of fat; and, thirdly, by a predisposition to disease being engendered through plethora and enforced idleness.

When in low condition, a horse will eat more and requires food of better quality, than when the system has for some time enjoyed the possession of good muscular tone.

Principles of Food.

Universal experience has established that food fitted to sustain an animal must contain an association of azotized and non-azotized substances—the former necessary to supply material for the reparation of structural waste, the latter to furnish the elements of

combustion requisite for the maintenance of animal heat and the performance of the respiratory functions.

Chemists and physiologists have theoretically ascertained the relative value of feeding stuffs, and whilst admitting that the correctness of their deductions are endorsed by the results of practice to an extent sufficient to admit the acceptance of their dicta as guides to the uninitiated in the selection of proper horse-food, practical experience demands from me a reservation of unqualified submission to the principles laid down by scientists, that the amount of azotized matter contained in a given article of food is the invariable standard of its flesh and condition-producing qualities.*

The subjoined table approximately sets forth the constituent parts of a series of articles commonly used as food for horses :

TABLE.†

	Water.	Woody Fibre.	Heat-producing Substances: Starch, Gum, Sugar and Fat.	Flesh-forming Substances: Nitrogenous Matter.	Ash or Saline.	‡ Value per 100 lb.; Liverpool Market, 1881.	Approximate Cost of each unit of Nitrogenous Material.
						s. d.	d.
Beans (Cleaned Egyptians) ...	14·5	10·0	46·0	26· 0	3· 5	7 4	3·4
Oats.....	11·8	20·8	52·0	12· 5	3· 0	7 4	7·0
Barley.....	13·2	13·7	56·8	13· 0	3· 3	6 6	6·0
Maize	13·5	5·0	67·8	12·29	1·24	5 10	5·6
Hay (Good Clover)	14·0	34·0	43·0	5· 0	5· 0	5 4	12·8
Carrots	85·7	3·0	9·0	1· 5	· 8	2 8	21·0

The third column of this table furnishes a representation of the constituents which, when introduced into the system, are transformed by the process of mastication, digestion, and assimilation into material for the maintenance of animal heat, and to

* See p. 59, on 'Potatoes as Horse-food.'

† 'The Feeding and Management of Draught Horses,' by C. Hunting.

‡ The last two columns have been added for the purpose of showing the market value of each article of food, and also the relative cost per unit of flesh-forming material contained in each article.

repair waste caused by the unceasing functions of respiration and transpiration. A portion of any excess in this class of constituents taken with the food is stored up in the form of fat, to be re-absorbed and appropriated whenever there is a deficiency in the supply of non-azotized matter to meet an existing demand for it. The fourth column, representing the relative proportions of muscle-forming material in feeding-stuffs, possesses especial interest to the horse-owner, for upon a due supply of nitrogenous matter in a form capable of being assimilated, the reparation of nervous and muscular waste and the functions of general nutrition alone depend. Unless the food contains a sufficient proportion of these substances, the body must be inefficiently nourished and physical strength diminished, even if all the other elements of food are abundantly supplied. Unlike the elaborations of starchy and fatty matters, an excess of nitrogenous material cannot be stored to meet future demands, any superabundance being removed from the body by the various processes of excretion. Should an excess of this material be given for any length of time, and no requirement created for it by corresponding increase of work, disease must result.

The woody fibre contained in varying proportion in different kinds of provender, although possessing in some degree a composition similar to the non-nitrogenous constituents, cannot be considered as aliment; its function in the animal economy is to stimulate digestion and separate the richer particles. The ash and salines furnish material for renewal of the bodily frame and assist in the elaboration of secretions.

Almost every treatise upon the management of farm-horses contain formulæ of food allowances applicable for use at certain seasons, and during the performance of certain agricultural operations. If such formulæ are intended to have an object beyond that of demonstrating what combination of grains, roots, and fodder may be considered as typical of an effective food supply, they are almost useless. Some of them would no doubt be very serviceable if each farmer tilled his land in the same manner, worked his horses in the same way, and could produce or pur-

chase his horse-food at the same cost; but the circumstances which influence the relative value of articles of food are so numerous, and operate in such a variety of ways, that fixed standards of ration for horses upon the same farm are not in all years relatively economical: how much less then must they be considered reliable when applied to diversities of locality and altered systems of management!*

Selection of Food.

A knowledge of the feeding properties of each article of food, and a careful study of their fluctuating and relative market values, must alone guide the horse proprietor in his selection of the cheapest aliment capable of sustaining the health and condition of his teams. A brief *résumé* of the qualities of the various grains, roots, and fodder will therefore not be out of place.

Oats being better suited for the maintenance of condition, has no doubt led to their general recognition as equine food *par excellence*, and although horses moderately worked can be kept in good condition by a liberal oat diet, the practice of using them unassociated with other grain is generally extravagant, and always so when the work is severe. When the price of oats offers no in-

* The subjoined table illustrates the daily average consumption of provender during the year 1878 in a stud of upwards of 200 cart horses which I have the honour to manage:

Indian Corn.	Egyptian Beans or Canadian Peas.	Oats.	Oatmeal and Linseed.	Bran.	Hay.	Roots and Grass.
10 lb.	5 lb.	·2 lb.	1·3 lb.	2·1 lb.	10·6 lb.	·3 lb.

Maize, beans, or peas, with bran and cut hay, form the basis of the usual food allowance. The oats and linseed are used only for sick or delicate feeding horses. The oatmeal is made into gruel, of which each horse is allowed a drink on coming to his stable when the day's work is completed.

The roots and grass are given during the months it is considered advisable to use them. In autumn and winter the corn is bruised and given raw, except a night feed of steamed food three or more times a week. In spring and summer the grain is steamed, but an occasional meal of dry food is allowed as a change. A further change both in the proportion and quantity of the grain given is also frequently made as conditions of weather or work appear to indicate, but the autumn allowance is always the most stimulative. The bulk of the hay is given in the form of chop with the corn, two or three pounds only being given in the rack the last thing at night. In quality the best obtainable clover hay is used. A small quantity of straw is sometimes chopped with the hay. The horses are of average size, moderately worked at equable and regular labour every day (25 per cent. are also worked for about three hours each Sunday morning), and their condition is good.

ducement to the producer to sell and buy other food in substitution, they may be economically consumed by his own teams; but to ensure an accurate appreciation of their relative feeding value their market worth must from time to time be considered. Oats contain about 30 per cent. of innutritious husk, an item which must not be overlooked when comparisons of feeding value are made; and it is worthy of remark that light oats weighing less than 40 lb. to the bushel furnish as much if not more husk than heavier samples. Good oats should be heavy, have a thin skin, and be free from musty smell. Damaged oats produce injurious effects upon horses, and fatal results caused by their use have been repeatedly recorded. It is common in some counties to cut into chop unthrashed oat straw. With a good and well-ripened crop, and fair price obtainable, this practice is not economical; but when the crop has not been fully matured, or the sale value is very low, there is less objection.

Malting samples of barley are too expensive, and inferior qualities are better adapted for cattle than for horses, except, perhaps, when corn is given in association with grass, in which case barley appears to be superior to maize.

Rye is better than barley for horses, and although nutritious and palatable it is deficient in vigour-giving properties. Both barley and rye are, however, wholesome, and may sometimes be advantageously given in conjunction with other articles of food.

During the last fifteen years the use of maize as diet for horses has become almost universal, and its value in this respect is now fully recognised. Reference to the analytical table demonstrates that compared with oats maize contains more heat-forming and slightly less nitrogenous elements, whilst its proportion of indigestible material is very much less. Maize is especially adapted for cart horses, and unaided by other grain it is able to maintain them in fair working condition; its feeding properties appear to be sensibly increased by association with a small proportion of more highly nitrogenous food. So combined, it forms one of the best and cheapest diets for working horses. Maize has been blamed for producing greasy heels, and other ailments usually

caused by 'heating' diet; so it will, if the use of it is abused, as what rich food will not? But when given with due consideration to age, constitution, and work, no greater evils will follow its use than other stimulating foods will produce.

It is well to remember that maize and rye possess laxative properties in greater degree than other cereals or legumes, but are more deficient in salines.* As offered in the market, the quality of maize can be readily appreciated; the bulk should be inodorous, and unmixed with husk, the grains very hard and free from mildew.

The benefit resulting from the use of beans and peas in rearing colts up to two years old has been previously adverted to. Leguminous seeds, on account of their highly stimulative properties, are not admissible for young horses after youthful development has been achieved, but for hardly worked horses upwards of six years old, they form an excellent and highly nutritious diet, requiring, however, to be supplied with judgment in quantity proportionate to the amount and severity of the work.

English beans are generally too expensive to admit of their economical consumption by farm horses, but clean, dry Egyptians are very little inferior in quality, and always rule lower in price.

Peas being sometimes weight-for-weight cheaper and equally nutritious, may often be substituted for beans, with pecuniary advantage. Beans and peas should never form the chief part of the grain allowance, unless the conjoint articles of provender are extremely poor; they seem to be especially adapted for admixture with cereals, and particularly with maize.

The improved wheat-dressing machines of the present day leave so little flour adherent to bran, that it can scarcely be considered an aliment. It is, however, palatable, and its silicious ingredients and laxative properties render its use generally beneficial.

For healthy horses linseed-meal is not a desirable addition to their regimen, but the use of linseed-cake water for the purpose of moistening the manger food whenever the latter possesses con-

* The small amount of mineral matter contained in maize is probably the reason why that grain is so unfitted to be used as an article of diet for in-foal mares.

stipative properties is of high value. The cooking-house of every stable is incomplete without a trough for the preparation of this useful adjunct.

For the feeding of working horses, most practical men agree that restriction to one kind of grain is injudicious and uneconomical. It is true that many large studs are exclusively maintained upon maize, but horses appreciate a change, and are invariably benefited thereby, even though each alternation is a reduction from a higher to a lower standard.

Where only two grains, as maize and beans, can be economically used, an alteration between the relative proportions of the two is always productive of good. Mr. Hunting's remarks on the benefits resulting from the use of mixed grain are corroborated by practice. He says: 'Both chemistry and physiology, then, suggest that more than one kind of grain is advisable if we aim at economy and high condition. But the full economy of mixed feeding is only seen when we consider the money value of the different articles of provender in relation to their nutritive constituents.'*

It is important to note that all changes from constipative to laxative diet, and the converse, are to be brought about by gradual substitution.

Hay and straw are essentials for the maintenance of healthy and vigorous horses during the winter months. Upon the excellence of these articles, and more especially the hay, depends the cost of keep and immunity from disease. The quantity of bad hay got rid of—consumed it is not—by some teams is enormous, and, if calculated at its lowest value, costs as much as a sufficiency of really good hay. Added to the excessive amount used, account must be taken of the additional loss by good corn being mixed and wasted with the unpalatable chop. As the hay-growing farmer cannot afford to use one of his most profitable crops for the maintenance of his horses, he must consume the least saleable portion of it upon his own farm. Whether it is profitable for the grower to use the inferior article is a question for individual

* 'Feeding and Management of Draught Horses.' C. Hunting.

estimation; but to *buy* bad hay for consumption by horses is certainly not economical.

For cart horses, rye grass and clover hay, containing a larger percentage of both heat and flesh-forming ingredients, is much superior to meadow hay. Analyses by Professor Voelcker, Professor Tanner, and Mr. Pringle demonstrate that Mr. Hunting's estimate of hay as a flesh-producer is too low. Professor Voelcker states the proportion in clover hay to be 9·3, the two other authoritives 13·52 for clover and 8·44 for meadow hay. The value of no other crop is so much enhanced by careful harvesting as hay. Good rye grass and clover hay is known by its freedom from dust and mould, by an agreeable smell and sweet taste, and especially by the bright light guinea-gold colour of the cut ends of the truss, by the adhesion of the seeds to the rye-grass spikes, and by the uniform interspersion of clover stalks; it is hard and firm but not harsh to the touch.

The qualities of hay are only secured in perfection when it is mown before the rye-grass seeds are fully ripe, and when it is gathered free from rain or dew at the right moment, after sufficient but not too prolonged exposure to sun and air. Slight deviation in either direction inevitably results in loss of quality. Fusty or mouldy hay is unpalatable, innutritious, and detrimental, whilst heated or mow-burnt hay—namely, that which has undergone too much fermentation in the stack—palls the appetite, and when very black and brittle in texture its use is essentially injurious to horses, acting as a powerful diuretic and producing excessive thirst, with the usual concomitants of debility and emaciation. On the other hand, hay that has become 'weathered' from too prolonged exposure to sun and wind, as well as that made from grasses that have been allowed to become too ripe before being mown, is inferior; it is harsh and brittle, weighs lightly, is devoid of brightness, deficient in nutriment, and is thus uneconomical to use though it is not absolutely pernicious for horses. Hay when harvested under the most favourable circumstances should not be used until the following November, and is in the best condition from June to September in the following year that is when from

eleven to fourteen months old. Horses like new hay as a change, but until the fermentative action has completely subsided, it has a purgative effect, and is innutritious and debilitating. Under circumstances where it is absolutely necessary to use the new crop before the middle of October, it is preferable to consume over-ripe or even slightly weathered hay rather than heavy juicy samples. As a general rule, hay deteriorates and becomes dry after being stacked for upwards of eighteen months; though when grown upon rich soil, mown and gathered under conditions calculated to ensure super-excellence of quality, it is often after that age more nutritious than the succeeding year's crop. Managers of large studs are wise when they secure a stock grown in years that have been favourable to successful harvesting; there are seldom two consecutive summers of this kind, and close observers know that seasons very greatly influence the quality of hay.

Beyond being a good judge of quality, the purchaser of hay for town horses should possess a knowledge of the class of land upon which it is produced; that grown on poor soils will be at least ten per cent. less nutritious than the produce of rich and well-tilled land, yet to the ordinary senses little difference may be appreciable. Many persons have discontinued the use of hay as rack food, and no doubt it is more economical to give the greatest proportion in the form of chop, with grain; yet a small allowance, put in the rack late each night, is highly appreciated. To prevent waste, only a very small quantity of long hay should be given, and that of the best obtainable quality.

The clover hay grown upon arable farms being generally required for rack food, the use of chopped straw in place of hay chaff becomes almost an absolute necessity. Oat straw is usually preferred for horses, but many good keepers use wheat straw; they say it produces a finer coat, and I allow that for horses with defective wind it is undoubtedly better than any other description of fodder. Bean straw is comparatively rich in feeding properties; when cut for chop, and steamed for some hours, it affords an agreeable addition to manger foods.

Where hay chop is not at all, or only partially, given, the difference in nutriment between it and straw chaff must be balanced by an increased corn allowance. Under all conditions, the substitution of some sweet chopped straw of any kind for a portion of the hay chaff is an economical and otherwise beneficial practice, but the relative proportions must be determined by special circumstances.

The seeds that fall from the hay in the loft and cutting-room after being separated from dust by washing, during which process the seeds float and the impurities subside, should be steamed and given with the ordinary cooked food.

In districts where potato cultivation is general the use of this root as an article of equine diet is extensively adopted, especially in seasons conducive to the development of the disease peculiar to the tuber. Potatoes are usually given after being steamed or boiled, mixed with the chop, and a small allowance of corn. Theoretically they possess only a very small amount of flesh-forming principle, yet some authorities credit them as being about one-third as nutritious as oats, and in practice it is found they are capable of sustaining horses in good condition with but little help from the corn-bin.

Turnips and mangolds of sound quality are useful addenda to dry unpalatable winter keep. They are wholesome and non-stimulating, but furnish little support to hard-working horses. On the contrary, they ought, associated with cut hay or straw, to form the basis of food for idle horses, living in stables and yards. Many persons boil or steam these roots, but for town horses I am in favour of giving them pulped and uncooked, during the months of December, January, and February.

The cost of carrots is usually prohibitive of their general use for draught teams. In my opinion they are the best adapted of all roots for horses, and even when at a high price are economical for an unthrifty animal.

Pasturage.

It is wonderful how efficiently a grass pasture is capable of supplying all the requirements for food. When old and rich, it will (unassisted by corn) sustain farm horses through their summer work. It is a common but improper custom to turn farm horses out to grass, and re-stable them at fixed times, regardless of weather, state of the pasture, pressure of work, and many other considerations which ought to regulate those periods. The practice of grazing sound and healthy farm horses is frequently condemned as wasteful; it is said they spoil far more food than they eat, and that a more economical method is to soil them in fold-yards upon cut clovers and other kinds of green food. That there will be less waste of material by the adoption of the latter process is certain, but the benefits to be derived from the enjoyment of pure air and liberty have to be sacrificed. Young horses especially, and farm horses of all ages generally, are benefited by being pastured in summer. Aged horses should never be allowed to lose condition, as some do if exposed, and the corn allowance reduced; if turning to grass tends to that end, the usual manger food should be continued during the time they are pastured, or stable shelter allowed, and green food supplied in the rack.

When suspension from work is prescribed for town horses suffering from lameness or 'grogginess,' it is often considered desirable on economical grounds to send them to pasture; if the lameness is slight there is no objection to the practice for horses under seven or eight years old, but it is very unwise to send away horses to graze that are suffering from painful wounds, or sprains to tendons and ligaments (at least until the acute symptoms have abated in intensity), and from all descriptions of lameness where *rest* is an important auxiliary to surgical treatment. Horses that have been worked with bearing-reins and those that have been continuously stabled for several years, frequently experience great difficulty in obtaining sufficient food in a good pasture; on inferior grazing-ground they are often brought to the verge of starvation during the first two or three weeks of being turned out; after that

time they usually but not invariably acquire greater facility in grazing. Those having undue length of fore-leg, and others with disproportionately short necks, always lose flesh at pasture. It is never wise to graze old town draught horses; they lose condition rapidly, and when restabled are so long in regaining it that they are worn out before the owner is repayed the cost he has thereby incurred.

Green Food.

Grass of very succulent quality, and especially that grown on water meadows and sewage irrigation land, contains very little nutriment, and is unsuited to the requirements of working horses.

Tares or vetches are well adapted for, and are much liked by, horses; those sown in the spring coming in late in summer, when pastures often afford a limited bite, are very useful, whilst winter tares are especially desirable for spring food on arable farms. Vetches under all circumstances, and grass when wet with rain or dew, should not be given for some time after being mown.

When horses are supplied with their early spring ration of green food they are apt to eat too greedily; for the first few days it is advisable to limit the quantity, and supply it to them after the manger food has been eaten; subsequently the allowances may be increased, or the horses turned to pasture, without fear of bad results. It is my usual custom to recommend for town horses that the green food be always given chopped, and mixed with hay, chaff, and corn. I believe the same practice adopted for farm horses would be equally beneficial and economical.

Quantity of Food Required.

A selection of diet having been determined upon by careful estimation of the relative feeding value and comparative cost of each article, the horse-owner's next consideration must refer to the quantity suited to the circumstances of his team.

To preserve a just balance between food and work, which the condition of the horses will pretty accurately demonstrate, the farmer must be quick to increase, and as prompt to diminish, the

corn allowance as demands for it are created or disappear. The amount of dry food a cart horse will consume is governed by several circumstances, such as its quality and the nature or severity of the work, age and condition of the animal, season of the year, etc. The weight of dry food absolutely consumed by an average-sized, well-conditioned cart horse, moderately worked, regularly fed, well housed, and supplied with diet of good quality, is from 29 to 34 lb. daily, of which the hay and straw should constitute about two-fifths. However nutritious the food may be, less than 29 lb. will not suffice to maintain the digestive organs in healthy action.

If the quality of the food is not sufficiently rich to supply material for the reparation of tissue waste, an attempt to meet the deficiency will be made by the consumption of an increased quantity. A superabundant supply of innutritious provender to compensate for deficiency in quality not only embarrasses the digestive functions, but handicaps a horse with an incubus of bulky dead-weight.

Horses severely worked eat more than those moderately used, and ought to be supplied with concentrated food, rich in flesh-forming principles and easy of digestion. Idle horses, and those very lightly worked, will require a daily allowance of about 30 lb. ; but the quality must be in due accord with their absolute requirements. Horses of four and five years old require rather more food than those of mature age ; whilst old horses require both a larger, more easily digestible, and nutritious diet than younger animals. Condition exerts considerable influence upon the consumption of food ; poor horses eat larger quantities and require more nutritious diet than horses whose condition, being established, requires only to be maintained. Farm horses are usually subjected to severe work during the autumn months, and their systems are called upon simultaneously to furnish material for the elaboration and growth of their thick winter hairy covering —a combination of circumstances producing excessive drain upon nutrition, and one demanding to be met by a more liberal diet than is required at any other period. The farmer who would

have his teams in condition fit to fulfil their autumnal and winter labours must not be sparing of his corn during the months of October and November.

Preparation of Food.

Preparation of the provender is also an important consideration in reference to economy and efficiency of feeding. Horses possessing perfect powers of mastication and digestion are capable of extracting nutriment from raw and unbroken grain; but as every normal abridgment of labour conduces to economical result, the practice of crushing the allowance of raw corn is beneficial. It suffices if oats and barley are bruised just sufficient to break the outer skin; maize, beans, and peas should not be pulverised, but simply cracked or split.

Opinions vary in regard to the expediency of cooking grain for horses. I think the supporters of each view may be correct, and that diversity of opinion has arisen from dissimilarity of circumstances. For healthy horses performing more than an average amount of severe work, raw grain of good quality is unquestionably more sustaining than boiled food. When hard (that is, uncooked) corn forms the ordinary ration, a night feed two or three times a week of steamed grain, associated with bran, is an exceedingly good and agreeable change. At periods of the year when the demands upon team labour are moderate, the practice of steaming the corn is better for the animals, and also more economical. With a view of reducing the stimulative qualities of the keep, for horses doing only half work or less, the practice is especially good. A bushel of grain thus prepared will go as far in rendering the chop palatable as three times the quantity given raw. For young horses during the periods of dentition, as well as for old horses having defective teeth or weakened digestive powers, boiled corn is much preferable. Damaged grain of all kinds, if used, should invariably be subjected to the cooking process, and all steamed foods consumed before fermentation is set up. The process of steaming ought to be applied only to whole grain, and should not reduce it to pulp—horses dislike 'slops.' Many

persons assert that the addition of salt renders steamed food more palatable. I am not in a position to confirm or to contradict this statement, but I prefer that horses should be permitted to take or refuse the mineral by their being supplied with a lump of rocksalt in the hay-racks or mangers.

The advantage of cutting into chop all the straw and a great proportion of the hay allowance as a prevention of waste is now universally admitted, whilst the admixture of chop with corn necessitates complete mastication of both; for horses doing slow work, and their hours of rest consequently reduced, the benefits of the practice are increased. Chopped hay of good quality requires no further preparation; but for inferior hay, and especially if it be mouldy, the process of steaming for fifteen or twenty minutes, though it does not improve the nutritive quality, renders it much more palatable, and destroys many of its noxious properties.

All roots should be scrupulously cleansed from grit and dirt; the adherence of small stones may possibly cause irreparable injury to the teeth during mastication. If steamed or boiled before use, the process should not be carried too far, for when hard and crisp in the centre they are more highly relished.

When a mixture of grains, each having different properties, is given with chopped hay or straw, it is absolutely necessary that some trouble be taken to ensure complete mingling of the ingredients, in order that each horse may receive a ration of average quality. To attain this object, a large 'mixing-tub' is essential; the component parts of the feed being arranged in alternate layers can be easily and satisfactorily mixed by means of a light 'provender spade.' The most convenient form for the tub is an oblong; its capacity should be at least one-third greater than the bulk of provender it is intended to mix at one time; and it should be lined throughout with sheet iron, as wood absorbs moisture from the mass, and becomes by long use so offensively sour, that no scalding nor scouring will remove the taint.

Frequency of Feeding.

The anatomical structure of the digestive organs, and the physiology of digestion in the equine species, demonstrate the

necessity for a frequent supply of food and water. An observance of regularity and frequency in feeding conduces to health, condition, and economy by furnishing aliment at periods suited to the requirements of the digestive functions; whilst long fasts, followed by an inordinate supply of food, overtax the powers and impair the functions of digestion. Having regard to the abovenamed essentials, the use of a 'nose-bag' must be considered as an important appendage for horses when the nature of their labour prevent their being fed sufficiently often from a manger. As a horse cannot feed from a 'nose-bag' without losing some portion of his ration, it is better to supply for this special purpose a provender of diminished nutritive value, reserving the greater part of the corn allowance to be eaten in the stable. After the nose-bag has been removed, and before a horse is yoked for a 'dead' or heavy pull, the carter should ascertain that no food remains in the horse's mouth, for under those conditions the food may be intercepted in its passage to the stomach, and dangerous choking ensue. This is an accident to which canal-boat horses are especially liable.

Water.

The aphorism of 'a constitution like a horse' is in no way more forcibly exemplified than in noting what filthy liquid he can drink with seeming impunity. Ponds defiled by urine and dung of cattle, and teeming with organic impurities of every kind, are frequently the only sources whence a horse can obtain his allowance of water. Outbreaks of fatal disease are frequently the only occasions when the drinking-water is suspected of possessing injurious properties; no consideration is given to what prejudicial effects it may produce upon the maintenance of physical vigour and powers of digestion. For an animal so sensitive to cleanliness and sweetness as the horse, an abundant supply of wholesome water is quite as essential as good food. Troughs should be kept in a condition of scrupulous cleanliness, and the water frequently changed. As a rule, farm horses are not sufficiently often supplied with water. There should be no stint of it in regard to quantity,

except when the bodies are much heated, or after prolonged abstinence ; a little food, and a few mouthfuls of chilled drink at short intervals, upon such occasions should be given before the horse is allowed to completely assuage his thirst.

I am entirely opposed to the practice of allowing horses to drink from the cattle-troughs provided for the purpose by many urban authorities, being persuaded that many outbreaks of contagious disease are due to infection thus contracted. Public drinking-reservoirs should not be tolerated, unless the risk of disease being communicated from one animal to another through their agency is reduced, by maintaining in them a *plentiful* and *constantly running water supply*, and providing a suitable overflow. In any case it is safer to allot to each carter a bucket wherewith he may be able to obtain the requirement for his horses from 'stand-pipes,' erected in convenient situations.

When horses are severely worked, and arrive at their stables hot and fatigued, an allowance of 1 lb. of oatmeal made into gruel, and given just warm, is of greater benefit than 3 lb. of corn in the daily ration. It relieves thirst, and imparts to the stomach tone, for the efficient digestion of the solid food.

SECTION IV.—ON GENERAL MANAGEMENT.

Stables.

CART-HORSE stables are to be found presenting all gradations of construction, between the extremes of an open-ended, rude hovel, to a building fitted to shelter the best hunter in the kingdom In many localities it is customary for the farm-stables to be constructed in the form of an open shed, accessible at all times from the straw-yard. Such an arrangement obviating the necessity for tying up the horses, and permitting free movement amongst them, is the nearest obtainable approach to the more natural pasturage,

but it is adverse to the proper regulation and apportionment of their food.

The following description is intended rather to indicate what the requirements of a good stable really are, than to portray the condition of those generally attached to even good farmsteads. A study of the details and principles of construction will, however, serve to guide an occupier in the adaptation of means at his command for the improvement of an old and defectively-arranged building.

The site for a stable should be well drained, and the foundations dry. Damp stable floors and walls have been the ruin of many a good horse; rheumatic thickening and shortening of the tendons and ligaments, often wrongly attributed to undue strain or over-work, are not uncommon results of inhabiting damp stalls. If dryness is not obtainable by ordinary means, a vertical as well as a horizontal 'damp course' in the walls must be adopted, and the pavement of the floor laid in cement or bituminous asphalte.

Before newly-built stables are occupied, it is essential that they should be thoroughly dried, which can be most expeditiously effected by burning coke fires continuously within them for several weeks after they are roofed.

Exposed as cart horses are to sudden changes and inclemencies of weather, they feel the effects of external cold in proportion to the warmth of the stable they inhabit. 'A cool stable makes a healthy horse' is an ancient aphorism, but not less true than old, provided the temperature is not so low as to cause a sense of chilly discomfort to the horses after their exertions, and can be obtained without any of the occupants being exposed to direct draughts of cold air. In the construction of a stable the grand object to be secured is capacity. The internal measurements should allow a distance of eighteen feet between the front and rear walls, and a width of not less than six feet for each single stall, to provide sufficient air space (about 1,200 cubic feet per horse). If the stable has a loft overhead, the height required is twelve feet; but if it is open to the roof, sufficient capacity may

be afforded within the angle of the slopes. Many very good stables are arranged with stalls nine or ten feet wide, to accommodate a pair of horses; thus saving a length of ten feet in a ten-horse stable. Where breeding is conducted it is essential that there should be a number of sheds or loose boxes for the mares and young horses, and attached to every stable the provision of a few isolated, roomy loose boxes, for sick horses, is most desirable.

Unless a stable is properly, as well as sufficiently, ventilated, the health of the horses cannot be maintained. There is a vast difference, which the owner should be able accurately to appreciate, between the warm atmosphere of a well-planned stable, and the impure air of a badly constructed and ill-considered one.

Efficiency of ventilation can only be secured by a special arrangement of openings communicating with the external air. All doors and windows should be made as tight-fitting as practicable, in order that they may not destroy or even mitigate the good results to be expected from the system adopted.

The main points for the architect to consider in devising the means of ventilation, are how he can withdraw the foul and impure atmosphere of the stable, and replace it by a constant supply of fresh air, bearing in mind at the same time, that draughts directed upon the bodies and especially on the heels and legs of the horses are highly prejudicial.

To obtain the above object it must be conceded that the most perfect system would be one ensuring the removal of the vitiated air at or near the point of its maximum vitiation, and supplying its place by the admission of the fresh air as far removed as possible from such point.

From experiment, I am decidedly of opinion that the exhaust-shafts or flues must be more in number, but less collectively in sectional area than the inlet flues; in fact they must be so proportioned that the flow of air into the stable shall not exceed a velocity of five feet per second. By having a greater number of outlets than inlets, and by fixing them as far as possible from each other, the current on entering the stable is diffused, and so draughts are prevented. In the case of single stables where the

horses stand all one way, a nine-inch earthenware drain-pipe carried in the form of a syphon through the rear wall, and discharging the supply vertically at or near the ground-level, will be amply sufficient whilst the outlet shafts (one for each three horses), which may be six inch iron rain-spouts, should be fixed immediately over the boskins on the front wall, care being taken that the bottoms of these pipes are level with the underside of the flooring-boards of the loft above. These pipes should be carried through the loft and the roof, and should be provided with an inverted cone as a cap to prevent rain entering the pipe; but fixed at such a height above the orifice as not to impede the upward current.

In double stables, where the horses stand back to back, the same principle applies; in this case the inlets are carried from the external wall under the stalls and discharge the air in the centre of the gangway, both the front and rear walls being supplied with exhaust-shafts.

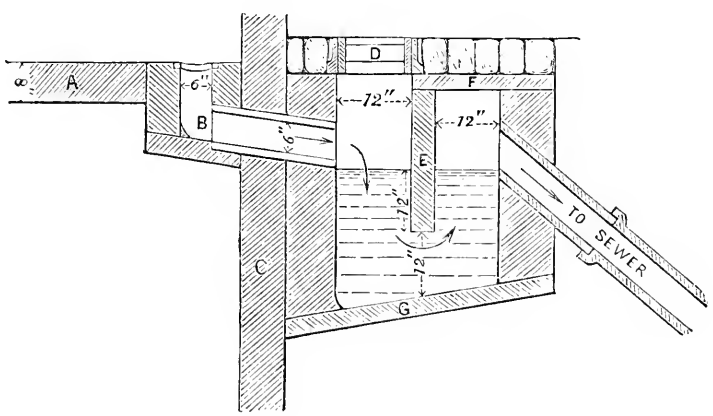
If this plan is adopted it will be found that an uniformly cool temperature may be maintained during the night, thus obviating the closeness many stables are subject to, especially in the early hours of the morning. If the loft above is used for the storage of hay or grain, all communication with it and the stable must be cut off or kept closed, to prevent defilement of contents of the former by exhalations from the horses and their surroundings.

Next to efficient ventilation, the paving and drainage are important elements of stable hygiene. Stable floors should be non-slippery and non-absorbent, both which desiderata are secured by a pavement of smooth sets of York stone, or one of the many softer kinds of granite, 6 inches long by $3\frac{1}{4}$ inches wide, laid with narrow joints, rendered impervious by bituminous asphalte.

The hind-legs of many cart horses have been ruined by defects in the levels of stable flooring, too much slope in the antero-posterior axis of the stall, and the provision of a narrow deep channel in which a horse can plant his hinder toes, for relief from undue and prolonged strain, have effected irremediable shortening of the hind-tendons. From the front or manger wall, for a dis-

tance of 5 feet, the floor ought to be perfectly level, the declination from that point to the channel not exceeding 1 inch in 3 feet; the hinder half of the stall may be advantageously sloped from each side to the centre in like ratio. The longitudinal channel-stones provided for the flow of the urine should be set at least two feet in the rear of the heel post of the boskins, and should be 12 inches wide, and dressed hollow in the cross section from edge to edge, the maximum desirable depth in the centre being 1 inch. The rear platform must be nearly level, non-slippery, and allow a space of 8 feet between the wall and boskins.

For all stables surface-drainage is by far the best, a minimum of attention and labour being required for the frequent removal of matters which usually find their way into the drains, whereas underground pipes always become fouled, and unless very frequently and thoroughly flushed are in themselves factors of noxious emanations, apart from the means they afford for the ingress of deleterious gases engendered by decomposing filth which it is folly to suppose any ordinary stench-trap can intercept. If a system of underground drainage is adopted the drain should be thoroughly ventilated and disconnected from the sewer, emptying itself into a cess-pit, or upon a manure-heap. The annexed drawing demonstrates the manner in which gases may be prevented from entering a stable.



A, Channel stone in stable.
B, Outlet from stable.
C, Stable wall.
D, Hinged grating for ventilation and cleansing.
E, Flag Midfeather.
F, Flag cover to closed side of wet trap.
G, Flag bottom to wet trap.

The interior fittings should be adjusted with regard to the prevention of accidents, economy of space, and maintenance of order. All hooks and pegs for hanging up the harness are most conveniently placed in the rear or end walls, at a sufficient height to guard against injury to the horses in passing, and the provision of a small cupboard let into the wall, or fixed under the manger for the tools of each teamsman, is a neat and economical addendum to the furnishing of a large stable.

Racks and mangers constructed of iron are more cleanly and durable than wooden ones; upon economical grounds the racks can scarcely be made too small, or the mangers too large. Four pounds of long hay is as much as should ever be allowed at one time, but the manger should extend the whole width of the stall, and be sufficiently large in all its dimensions to permit the horse to follow his inclination for tossing his food about without risk of waste.

The measurements of the best cart-horse manger are 6 feet in length by 14 inches wide and 10 inches deep. For the prevention of waste each manger is provided with a semicircular lip, an inch wide, along the upper outside edge, on its inner aspect, and a flat wider one on the wall edge, with two transverse bars fixed at about 20 inches from each end.

A leather head-collar, with rope tag, is preferable to a neck strap and chain, but either are admissible. The material and construction of these appendages are of much less importance than the adjustment in the length and the mode of fixing the tie-rope.

The doorways should be 8 feet in height, and not less than 4 feet 6 inches wide, the doors arranged to slide, the quoins rounded and free from projections.

The length of the boskins for a full-size stable should be 10 feet, the height sloping from 7 feet at the head to about 4 feet 9 inches at the heel-post. Boskins should be of strong construction, securely fastened, and maintained in thorough repair.

The granaries and lofts attached to all stables should be abso-

lutely inaccessible to pigeons or poultry, and in towns they should be capacious enough to enable an owner to take advantage of cheap markets to lay in a considerable stock of hay and corn.

STABLE MANAGEMENT.

With every provision made for good shelter, and a plentiful supply of nutritious food properly prepared, horses will not thrive unless the discipline of the stable is efficiently maintained. If the proprietor himself cannot supervise the management of his team from early morning till late at night, the charge of so important a trust should be given to the head-waggoner, to whom the owner should attach supreme responsibility, and remunerate in proportion to the extent of his charge. The allowance of a few extra shillings per week to a man fitted by the possession of natural ability, habits of industry, and faculties of observation to occupy such a position, will yield excellent interest to the owner.

I hold it to be an essential that the feeding of all the working horses of an establishment should be entrusted to one man, who will estimate the varieties of appetite and differences in disposition amongst his charges, and provide for and humour them accordingly. To weigh out a weekly allowance of corn to each team-driver, and expect him to apportion it with due regard to the wants of his horses, is to estimate the general character and intelligence of teamsmen far too highly. If the head-waggoner is held responsible for the proper conduct of the stable and for the condition and cleanliness of the horses, and is called to account for the quantity of food they consume and the amount of work they perform, it will be his interest to maintain the stable and its occupants in creditable form, with economy in cost.

It is unnecessary to enlarge upon the details of stable management, the principles of which consist in the establishment of safety, order, regularity, cleanliness, and prevention of waste. There are, however, two or three points to which the attention of horse-owners may be forcibly directed.

In well-kept establishments where the removal of the dung and soiled litter is punctually attended to, it is not necessary to wash

out the stables very frequently; but during the spring, summer, and early autumn months, the stalls, gangways, boskins, mangers and racks should be occasionally well scoured, to remove impurities which dry sweeping and ordinary cleansing cannot effect. After thorough washing, which should always be performed on fine bright days, the windows and doors must be opened wide to facilitate evaporation, and the drying process may be hastened by sprinkling sawdust or dry sand over the floors. The operation of thoroughly cleaning out the wet traps and efficiently flushing all underground drains ought to be undertaken weekly. Once a year all internal walls should be thoroughly whitewashed, and at least four times within that period the front walls above and below the mangers should receive a similar application. Half a pint of crude carbolic acid, which is an excellent disinfectant and purifier of air, should be added to each gallon of the limewash. After washing the floors or whitewashing the walls, it is desirable to burn a good coke-fire for several hours, taking care that all doors, windows, and ventilators are left open.

During a continuance of wet weather nothing tends more to the maintenance of health than keeping the air of the stable as dry as possible. The evaporation from the horses' skins on coming in from work drenched with rain greatly increases the dampness of the ordinary atmosphere, which, under existing conditions of weather, is necessarily saturated with moisture. This excess of vapour not only renders the air less fitted for the purposes of respiration, but it condenses upon every part of the interior of the building, and even upon the body-surfaces of the horses. I have found that burning coke-fires in wet weather within the stables during the hours the horses are at work is a most beneficial practice for the prevention of many diseases.

The granaries and lofts require constant attention. In storing deliveries of hay and straw for future use, care must be taken that the trusses are quite dry, and are so stacked in the loft that their ends do not abut upon an outside wall. All old fodder should be used up in due course, and not be covered from time to

time by more recent deliveries until it becomes unpalatable or useless from age. Each time the lofts or granaries become empty should be embraced as a fitting opportunity for thorough cleansing and the removal of impurities which necessarily accumulate.

A few words of caution to the responsible horsekeeper. Let food and water be supplied in small allowances at regular and frequent intervals; especially let ample time be afforded for the horses to eat a full early morning meal before being sent out to labour. Let the stable be maintained in a condition of purity and cleanliness by the admission of a plentiful supply of fresh air and the frequent removal of dung, soiled litter, rejected food, and filth of every kind. Maintain good discipline in servants and subordinates, and by example no less than by precept inculcate in them habits of kindness and care towards their charges; and, finally, by careful and constant watchfulness, note the most trivial symptom indicative of a horse being in other than his usual state of health.

Grooming.

It is not advantageous for draught horses, exposed as they are to the influences of weather, to be severely groomed. At the same time it must not be considered that they are efficiently 'dressed' unless adherent dirt of every description has been removed from the surface, and also all loose dandriff from amongst the hair. Farm horses should not be curry-combed, but brushed and well wisped over before being turned out to work, and again on completion of their day's labour. After being stabled wet, from rain or perspiration, the skin must be thoroughly dried, and at supper-time a brisk dry wisping instituted to determine increased surface-circulation, and promote a feeling of warmth and comfort for the night. For hardening the backs and shoulders of colts recently put to work, and of horses having irritable skins, a free application of salt and water to the saddle and collar seats is beneficial. Many persons advocate clipping the hair from the legs of hairy horses, a practice highly pernicious, and one to be

condemned in the strongest terms. Hair is the natural protector of the cuticle, and is especially required to warm and shield the delicate skin of the heels; its removal from these situations is certain to induce a predisposition to '*grease*' and other equally serious consequences. If the legs are muddy on return from labour, they should be dried as far as practicable, and the adherent clay subsequently removed with a hard brush. The application of the thinnest possible film of pure neatsfoot-oil to the surface of the hair of the legs will prevent the adhesion of clay, but it should only be used when absolutely necessary. Opinions vary upon the advisability of washing the legs of cart horses. As a rule, the practice is unnecessary and injudicious; but when the legs have become thoroughly saturated during labour, there can be no further harm occasioned by washing off any mud which may also have accumulated amongst the hair. It must, however, be regarded as essential to proper management that under no pretext is a horse to be left for the night until all his legs have been thoroughly dried. Nor is this precept very difficult of execution; a handful or two of light-wood sawdust rubbed for a few minutes well into the hair will absorb all the moisture from the most hirsute legs, affording not only a sense of comfort to the animal, but preventing those undesirable consequences engendered by continued application of cold and wet to the extremities.

Shoeing.

It is a *sine quâ non* for a horse of whatever description that he must possess sound and serviceable feet. Good feet are more frequently preserved by having too little done to them in the way of paring and rasping than by the reverse.

Mr. Fleming's remarks on this head are worthy of the highest estimation by every owner: 'The sole, frog, and bars must on no account or under any conditions—unless those of a pathological nature—be interfered with by knife or rasp. I have already shown the necessity there exists for preserving these important parts of the plantar surface in their full natural strength. As certainly as they are interfered with and their substance reduced,

so surely will the hoof be injured. They will support the contact of hard, soft, rugged, or even sharp bodies if allowed to escape the terrible drawing-knife; while hot, cold, wet, or dry weather has little or no influence on the interior of the foot or on the tender horn if man does not step in to beautify them by robbing them of their protection, perhaps merely to please the fancy of an ignorant groom or coachman.'*

As the growth of horn is stimulated by contact with the soil, it is undesirable for a colt to be shod so long as his labour is confined to field operations. With rare exceptions, the protection of a shoe is only required when the land is unduly hard or when road-work is required. The feet of colts grazed upon high and dry lands are usually maintained in proper form and proportion through the wear occasioned by search after food, but the very slight wearing effects of soft marshes or straw yards is insufficient to prevent overgrowth, and in such cases the hoofs must be reduced to their normal shape and size by a judicious rasping of the ground surface of the crust. Except under skilled direction, no other part of the feet but the plantar edge of the wall should be pared or rasped.

The adjustment of shoes to the feet of farm horses when road-work is the exception is a simple matter, yet one demanding some attention to prevent mutilation of important structures by the blacksmith's knife and rasp, and to preserve the *aplomb* of the limbs. The lower or ground edge of the hoof is the only portion of the foot requiring protection from the shoe; the frog, bars, sole, and outer surface of the wall ought invariably to be left intact. The growth downwards of the horny hoof in a shod foot necessitates removal of the shoes, and their readjustment when the foot has 'grown long.' Inattention to frequent removal of the shoes of farm horses is very common, and is prejudicial to the conservation of good feet, and also to the limbs, which become altered in position by the growth of the anterior portions of the hoof exceeding that of the heels. The shoes ought to be removed once in every five or six weeks.

* Fleming, 'On Horse-shoes and Horse-shoeing.'

Preparation of the foot for the reception of a shoe consists in lowering the wall to a level with the unpared sole, leaving all the other parts untouched by knife or rasp. As an index of what the foot should be like when properly prepared may be taken the foot of an unshod colt that has been travelled upon a moderately hard smooth road, until the crust is worn (not broken) to a level with the sole; by keeping in mind this standard, an owner may always judge whether his horses' feet are being unduly mutilated by the smith.

It is useless to over-weight farm horses with an excessively heavy shoe: lightness, strength, and durability are the main features to be achieved. A plain rim of iron, 1 inch to $1\frac{1}{4}$ inch wide, level on both its surfaces, accurately adjusted to the prepared foot, and having an equal and level bearing upon the ground, is all that is required. The shoes should be fastened with as few nails as possible, driven in directions least liable to damage the horn, and securely clinched. If the shoe has been properly fitted to the foot, there will be no superfluous horn to cut away at the junction of the shoe with the foot; no rasping or paring of the hoof after the shoe is fastened must be permitted.

The shoeing of horses required to work continuously upon hard and slippery asphalte or granite paved carriage-ways has in recent years received a considerable amount of attention, and although allowing that much improvement has been effected, it must be admitted that this important work is still some distance in the rear of the improvements adopted in the construction and maintenance of the roadways. There is a remunerative field open to an inventor who will introduce a non-slippery shoe fulfilling the other essential requirements—durability, suitability, and cheapness. For heavy draught horses moving enormous weights (say loads of from six to nine tons upon good roads per team of two horses) there is no shoe equal to that now universally adopted in the large towns in the north-west of England.

It is true that the shoe is heavy and clumsy in appearance, but its substance and form seem at present indispensable; the iron forming the outline of the shoe must necessarily be strong enough

to afford a maximum of resistance to the strain created by the exertion of the force employed in draught, as well as to afford secure attachment for the 'spurn' (toe-piece), and also to supply material from which substantial calkins may be forged. Objections are raised to these shoes on account of the obstacles they create to frog-pressure which is unattainable in them. In cart horses frog-pressure does not appear to be an essential for the preservation of well-formed feet, a fact which may be demonstrated by an inspection of any stud of horses where due care is exercised in the management of their farriery. Mutilation by the rasp and knife of those parts of the foot intended to protect the internal sensitive structures is, as far as heavy horses are concerned, the chief cause of contraction and deterioration of previously good and sound feet. I have frequently been astonished to note the misery and pain to which the dray horses of London and some other southern towns, travelling on smooth and slippery pavements of improved construction, are subjected to, by being shod with flat shoes, and have wondered what reasons can possibly be advanced for the retention of such a system. The weight of the London loads are utterly insignificant compared with those behind the Liverpool and Manchester teams, yet the horses flounder and slip at almost every step, affrighted, perspiring, and afraid to, employ one half their power in drawing, for fear they may be called upon to use the other half to preserve their equilibrium. If owners would calculate the cost of such shoeing by estimating the loss of earnings on goods carried per horse, added to the loss of condition or its equivalent represented by increased cost of keep, and useless wear and tear of horse-flesh, I feel persuaded that a modification of the system of shoeing practised in the northern towns would quickly supersede the mode more generally adopted in the south.

The application of stopping and emollient preparations to the horn are unnecessary, unless the foot is diseased, or has been rendered defective by previous and repeated mutilations.

Horses with flat feet, weak heels, thin soles, and soft prominent frogs, are benefited by wearing a wider-webbed, heavier shoe,

thickened or caulked at the toe and heels to relieve undue pressure upon a preternaturally large and soft spongy frog. The converse holds good with thick upright feet, for which all available means should be employed to obtain frog-pressure.

Harness.

Those who continue to use heavy cart bridles furnished with large winkers must entertain a very low estimate of a horse's natural intelligence, and possess very little regard for his comfort. If a good-couraged horse is allowed to see and become familiar with objects of danger, he will quickly learn to disregard them, and know no fear. A colt that has never worn winkers, by kind treatment will quickly attain sufficient confidence to face anything. The bridle should not weigh more than 4½lbs., have no winkers, fit easily on the poll, be padded down the cheeks, and furnished with a round throat-strap, and a smooth jointless snaffle-bit.

The collar, intended as it is to supply a cushion for the reception of shocks and afford relief to pressure under heavy and continued draught, cannot well be too bulky nor too accurately adjusted. Great suffering is entailed, and horses are prone to become vicious and shy workers, by being worked in collars too large or too small, or unadapted to special conformation of shoulder, or rendered uncomfortable and irritating by wear, or the accumulation of filth.

Under severe uphill draught the collar will sometimes choke the horse by pressure upon the lower part of the windpipe. This accident usually happens to horses that have long sloping shoulders and fine withers; it may be prevented, or at least the liability may be diminished, by having the collar 'piped'—that is, hollowed out at its lower end where it may come into apposition with the windpipe as that tube enters the chest. It is prudent to work horses prone to choke by the collar, in chains rather than shaft-gears.

The cart-saddle should be well padded, and possess ample length and width of tree to afford extensive and equal bearing. To prevent abrasions on horses having sensitive and thin skins, the

linings of all parts of the harness and the inner aspect of the breech and backbands should be covered with sheepskin.

It is well to remember that the greatest draught-power of which an animal or team of animals is capable is most perfectly secured in proportion as the bonds of connection between the harness and the waggon or cart are inelastic.

Every part should be maintained in good repair; many accidents are occasioned and not a few runaway horses made by defective gearing. On many farmsteads only rainy days, sometimes few and far between, are devoted to the cleansing of harness. Such neglect cannot be economical in practice; dirty collar and saddle linings are prolific causes of sore shoulders and backs. When damp from rain, or fouled by perspiration, the linings ought to be thoroughly dried, and as thoroughly cleansed by scraping and brushing, whilst the leathers will be more supple, durable, and comfortable by frequent applications of pure neat's-foot oil.

A great deal has been written upon the use and abuse of the bearing-rein. In regard to its employment for cart horses, I submit reasons given to a body of large proprietors in the year 1876 (for its retention), and I may remark that subsequent experience has strengthened the opinion I then entertained.

REPORT.

The bridle of the hunter or hackney is as much a bearing-rein as that commonly attached to carriage and draught horses, with one important difference. In the latter instances, one end of the rein is attached to an unyielding part of the harness, whilst in the former cases it is controlled by the hands of the rider.

No one who has witnessed the finish of a closely-contested race, or who has been accustomed to ride to hounds, can doubt that the horse derives great assistance from skilful manipulation of the reins by a good horseman, and in proportion as the labour is severe so does the assistance afforded by the rider appear to increase.

There is, undoubtedly, an intelligence conveyed to the horse by his rider through the medium of the bridle; but that is not all: the horse feels for support from the bit, and trusts to it, when making severe or protracted efforts.

With regard to carriage horses, I think that (except when worn quite loosely, and for ornament alone) bearing-reins are both cruel and useless. The hands of the coachman should be quite sufficient to give whatever assistance his horses may require, and, if he has 'good hands,' he will make his horses carry a better head without, than with, a bearing-rein.

With horses used for the purposes of heavy draught, the case is entirely

different. The position of the carter being at the side instead of behind, he cannot render his horse any assistance by manipulation of the reins, and the bearing-rein, being attached to the unyielding and non-sentient hames of the collar, can convey no intelligent impression therefrom to the horse's mouth; but these two circumstances *do not prevent the animal from employing his own intelligence in using the rein*, if permitted to do so by its proper adjustment.

As a matter of fact, it is admitted by almost all men practically acquainted with the subject that a draught horse can move a greater weight with, than without, a bearing-rein; and I conceive the reason for this to be, that it affords support to the horse's head, and assists in the establishment of a balance of power between the upper and under muscles of his neck. A horse, provided with a properly-adjusted one, will use his own intelligence in the employment of it, and will seek its aid to support and maintain his head in that position which experience has shown him is the most comfortable to himself, and the one in which he can exert his greatest strength.

To accomplish the purposes which I understand the bearing-rein serves, it must be applied with intelligence, and be always sufficiently free to permit the horse to relax every muscle of his neck when he desires to do so. It may do all this, and yet be sufficiently tight to afford material support under a severe effort of draught.

In adjusting the rein, due consideration must be given to varieties of conformation. To cramp the muscles of a horse with a tight bearing-rein is a senseless, useless, and cruel practice, but is one which I look upon as being an abuse and not an intelligent use of an auxiliary appendage to cart-horse harness; and, I believe that a properly-adjusted rein affords no inconsiderable assistance and comfort to a horse frequently called upon to stop and start his load.

By disuse of the bearing-rein cart horses contract a tendency to become careless and slovenly in their gait, and to carry their heads to the near side from absence of equal bearing on both sides the mouth; and, in my opinion, it is as reasonable to expect a hackney ridden with a slack rein to carry his rider safely and well, as for a cart horse, unassisted by a bearing-rein, to be clever, active, and safe at his work.

Clothing.

The provision of stable clothing is altogether unnecessary for cart horses in health; it is, however, an essential for the treatment of many diseases to which draught animals equally with finer-bred ones are subject.

Opinions differ with regard to the use of a covering for horses when performing slow work, but the custom to provide clothing for outdoor wear has become almost universal in northern towns. The judicious use of clothing for horses during the hours they are exposed to inclemencies of weather is undoubtedly advantageous, but unless rain is falling it is as unwise as unnecessary to permit the use of a cloth during the actual performance of work: it should only be employed as a protection against rain or to prevent the bodies cooling too rapidly after exertion. For the latter

purpose, stout woollen rugs are unquestionably the most suitable; but as a protection against rain, waterproofs are decidedly preferable. Woollen rugs absorb so much moisture as to become an absolute burden to the horses, and cannot be thoroughly dried in a limited space of time. The great objection to the use of oilskin and all other impermeable descriptions of clothing is the sense of oppression and discomfort produced by the wearing of such a material. Exposure to rain in the abstract is not harmful, if the horses can be taken to the stable direct from work and have their coats thoroughly dried and the skin circulation stimulated by friction; but as almost all kinds of team-work in towns is performed by alternations of strong exertion and inactivity, the bodies of horses that have been exposed to rain do not receive necessary attention until the labour of the day has been completed, and hence arises the necessity for protection by clothing. The provision of covering is also advantageous for preventing the linings of collars and saddles becoming wet, a frequent cause of sore shoulders and backs.

Breaking.

A horse-breaker of the very old school once observed to me, 'There are no *bad* horses; bad men make 'em.' And although almost every variety of disposition and temper is met with in a large stud, there are few horses, and still fewer colts, naturally vicious, or ill-disposed to submit to control.

The education of young horses is too often entrusted to men devoid of sufficient acumen to estimate character, and who are deficient in that patient resolution so essential for the proper management of a colt. Intelligence is not by any means equally distributed amongst horses; some are very slow learners, whilst others appear to grasp at once what is required of them; yet ignorant men usually adopt the same means for the governance of the high-couraged percipient colt as for the dull lethargic dunce.

Youth is the age of receptivity. Before the character is formed and habits are acquired, the foal should be daily handled about the head, legs, and feet, and taught to obey the voice of his

attendant in all the little details surrounding his early existence. He will appreciate a caress and the gift of a few grains of corn from his master's hand, and quickly learn to look on them as rewards for docility or obedience.

Before being weaned he should be made to wear a head-collar, so fitted as to cause as little annoyance as possible, and so constructed that there will be no danger of its catching projections of fencing, nor afford room for the entanglement of the feet in the nose or throat bands. The foal should be led about, taught to stop and move in obedience to the voice, and be tied up whilst eating his daily ration of artificial food. By these means he will be so imperceptibly accustomed to restraint that the loss of liberty will scarcely be felt.

From the period of this early subjection to control to the time the colt is yoked for work, no opportunity should be lost for periodically submitting him to restraint. He will never entirely forget his first lessons when they have been properly given; at the same time, he will be benefited by being periodically reminded of them by repetition.

When the above precautions have been neglected, and the colt remains in a half-wild condition until the time has almost arrived for him to be put to work, the process of haltering should be undertaken with very great patience and care. Every word or gesture having the least tendency to frighten him, or to create a suspicion of ill-treatment, is to be avoided, and every inducement offered whereby a feeling of confidence in his attendant may be established.

It is a good practice to allow two or three-year-old colts to run in a large straw-yard or field, with the shanks of their halters hanging loose, before they are subjected to further restraint, taking care that the head-stalls (which should be leather) are properly adjusted, and that the hempen shanks are securely twisted into a coil during the night.

When the colt has been led about by the halter, taught to obey commands, and become familiar with the sight of and proximity to implements, carts, etc., he may be tied up to be fed alongside

an older horse. He should be left so restrained for some little time after completion of the meal.

It is very necessary to tie up colts very securely, and to be assured that the halter and place of attachment are sufficiently firm to prevent any attempt at breaking loose proving successful.

When once restraint has been broken, it is almost certain to be re-attempted, and a dangerous habit liable to become confirmed.

When the head and neck hold perfect relations to each other there is no difficulty in making the colt a 'good mouth;' 'bad mouths' are most frequently the result of improper violence on the part of the breaker, or are due to unevenly-adjusted bearing-reins. It is good practice to put on a moderate-sized, jointless, smooth snaffle, regulated to hang near the site of the tush, and attach the reins evenly, but not tightly, to a surcingle, and allow the colt thus equipped to run loose two or three hours twice a day. After the colt has become sufficiently accustomed to this species of control, an hour or two for a few days will be profitably spent in using him to harness; it is especially desirable to let him feel some pressure of the collar, and to become familiar with the rattling of chains.

To animals that have lived in open fields the confinement of a stable is at first irksome, and colts should not be subjected thereto until they have commenced to do a certain amount of work.

If the demand for team-work will allow delay far enough into the spring, it is better for the newly-broken colt, when his work is completed, to be pastured at night with his companions in labour; the daily meals to be partaken in the stable with his associates will gradually and pleasurably accustom him to the change.

It is almost an universal custom on light-land farms to work a colt when two years old, and at three-years-old off he generally constitutes one of an ordinary team. On stronger soils the commencement of labour is sometimes postponed for six or twelve months longer.

The labour of young horses should be in proportion to their physical strength, and it should not, as is frequently the case, be

governed by the existing demands for their services. It is a mistake to over-work them; and undue call upon them and the debility of youth react disadvantageously, tending to provoke a disposition to vice.

When put to work for the first time, no coercion should be employed to make the colt draw; yoked with a team of steady old horses, and led for a short time, he will soon take to the collar voluntarily.

I am an advocate for accustoming a colt to shaft-work before he is turned to grass, after his first half season of labour, and recommend that after completion of a day's work in the field he should be yoked to an empty cart, and required to take it home in the immediate rear of his team companions.

Where breeding can be associated with the ordinary operations of farming, the number of horses should always be maintained in excess of the requirements, the fillies retained, and the geldings sold off at such seasons as they can be most conveniently spared.

The Selection of Horses for Draught Purposes.

The innumerable conditions which operate to produce varieties of team-labour render unsatisfactory any attempt at advice to purchasers of horses for specific purposes that might be given in a chapter of limited extent. If it were practicable to offer useful suggestions, they would be of little service to anyone who has not acquired by experience an accurate conception of this important section of horse-keeping; my remarks will therefore be confined to a brief recapitulation of the three cardinal points—symmetry, soundness, and action—prefaced by the assertion that a thorough knowledge of the nature of the work to be exacted and an actual experience of horse-power can alone be trusted as safe guides for the purchase of suitable animals.

Symmetry.—The practical eye of a horseman takes in at a glance symmetrical form, and his mind as quickly gauges the animal's capacity for performing a specific description of labour. When considering the outward porportions, temper and constitution of stallions and mares for breeding purposes, the salient

points of good and bad conformation were reviewed; those remarks apply equally to horses destined for the general purposes of team-work. A horse required to move heavy weights must be himself weighty; he ought to be 'all over' muscular, 'near the ground,' and possess strong, sound feet, broad back and loins, deep chest and ribs, prominent shoulders, wide between his fore-legs, and wide from croup to hocks; he should stand firm and square with his fore-limbs well outside him, the fore-feet in a direct line with the body, the hinder ones very slightly pointed outwards; the pasterns should be sufficiently oblique to indicate elasticity and freedom in action without being too slanting; all joints and sinews should be well defined, and the limbs clean and proportionate. For the purposes of heavy draught the necessity for excellent conformation of the hind-limbs is of far more importance than the symmetry of the anterior extremities, and although the perfect form and position for a horse's hind-legs are familiar to every experienced man, I have found the difficulty of correctly describing them to be so great that I have been reluctantly compelled to give up the attempt. Horses required for lighter and quicker work in pair-horse vans may be more upstanding, but they should possess depth of rib, plenty of heart-room, and all essential qualifications for usefulness.

Soundness.—As there are few absolutely sound horses, so there are a great number practically sound—that is, free from diseases or defects which are likely within a limited time and under reasonable usage to incapacitate an animal from satisfactorily performing a fair amount of labour. It requires considerable judgment, based upon extended practice, to know where practical soundness begins and ends, and upon this point it is not unusual to find wide divergence of opinion even amongst experienced men. All horses, to be useful to their owners, should be practically sound at the time of purchase.

The law of warranty, as applied to the soundness of horses, is perhaps capable of being more extensively abused than any other Act contained in the Statute Book. Many sellers, who upon inadequate evidence are ever ready to declare a horse 'sound,'

stand convicted of the fact that they have no knowledge of the meaning of the word, or that they do not know a sound horse when they see one. The term 'soundness,' applied to a warranted article, means perfection, and comprises not only the absence of any defect which may render it unfitted for use as a perfect thing, but also the absence of any imperfections which may at a future and remote period make it inapplicable for use as a complete whole.

It is right that the purchaser who pays a good price for a working animal should be protected from fraud in regard to staunchness of draught, freedom from vice and diseases the nature of which cannot be detected in a reasonably limited examination; but—*caveat emptor*—the buyer should be required to satisfy himself that a horse does not possess causes of unsoundness which are capable of being found out.

How many farmers have suffered loss and annoyance at the hands of unscrupulous dealers, who having bought an animal above his worth, and missed their market, threaten the seller with law, unless he takes back the horse at cost price, or refunds some portion of the purchase-money! Such a practice could not be successfully adopted in the business transactions with general articles of merchandise; but in horse-dealing, as an animal may be perfectly sound one day and a 'screw' the next, an opportunity is afforded for sending back an unsuitable horse upon an unjust pretext.

The facilities for wrongful return are rendered much greater by the fact that, although ninety per cent. of cart horses are practically sound for the purposes of ordinary work, not more than ten of that number are free from defects which may technically and legally be regarded to constitute unsoundness, and therefore furnish pretexts for breach of contract. As horses are returned upon the certificates of veterinary surgeons whose examinations are frequently made some time after the sale, it is evident the causes of unsoundness may have arisen whilst the horse was in the hands of the purchaser, and hence the conflicting opinions

of skilled witnesses who are called upon to express their ideas as to the probable time the defects have existed.

A seller having a sound horse for disposal will do well to protect his warranty by a certificate of soundness from a veterinary surgeon whose examination is made on the day of sale. In a court of law such a certificate from a man of known probity would outweigh opposing evidence, bearing only upon the probable duration of an alleged cause of unsoundness.

As the law stands, and for the reasons I have named, it is unwise for a seller to give a warranty, except in regard to freedom from vice and capacity for work; but he should, if required, guarantee the buyer against the existence of occult diseases, the evidences of which cannot be discovered.

If the custom of warranting horses was disestablished, dealers, who know accurately what practical soundness is, would give an equal price for an animal without as with a contract of security, and much annoyance would frequently be spared to the horse-selling farmer.

Action.—Second to soundness, and far more desirable than perfect symmetry, is the possession of good action; without it an otherwise excellent animal is incalculably depreciated in both value and usefulness. Good and true action is very frequently but not invariably associated with perfect symmetry, but the possession of it may be accepted as evidence of fairly equal conformation; for defective or slovenly action can only arise in a sound animal from an unequal distribution of physical power, or from want of stamina or pluck. In many horses good bold action is an evidence of power, and the heavier the horse the better he should move in both walk and trot. An educated ear can distinguish a horse possessing good action on a pavement, by a regular succession of sonorous thumps—one, two, three, four. In a walk, which is essentially the draught horse's pace, each of the four feet should be brought down perfectly flat, the heels, toes, and quarters reaching the ground at the same instant, the fore ones with the toe and heel in a line with the body, neither turned out nor in, the hinder ones the least bit everted. Straight

and full extension of the fore-limbs is desirable rather than excessive elevation of the feet by high knee and shoulder action. The movement of the hind extremities should be free and loose, the feet carried far under the belly by perfect flexion of the hocks, which in advancing should in turn have a slightly inward tendency, and the toe at the same time should be as slightly turned outwards. Defective and wide hind-leg action, usually arising from malformed hocks possessing but limited mobility, is most especially to be guarded against; horses with round bowed-hock action always wear unsatisfactorily. Following the extension of each limb in turn, the corresponding foot ought to be boldly and firmly planted upon the ground; the least sign of weakness, faltering, or unequal movement during progression may be regarded with grave suspicion, and it is much safer to refuse an animal where such reasonable grounds have been aroused than to run the risk of effecting an unsatisfactory purchase. Whenever practicable, a trial at work ought to be insisted upon before a purchase is completed, not only for the purpose of ascertaining that the power and temper of the animal are suited to what is required from him, but also that any symptom indicative of defect or unsoundness, particularly of the respiratory organs and spine, may be more surely detected.

Work.

Perhaps there is no element of successful horse-management that requires more careful attention than the arrangement of the work of a young horse just purchased from a farmer for town purposes. It must be conceded that the entire change of food, stabling, work, and general treatment and surroundings renders this period one of the most critical of the animal's existence, and one when the greatest watchfulness and care are required from his attendant; he may be plump, gay, blooming, and in fair working condition, and perform a full day's work at once to his new master's entire satisfaction, but on the morrow he will most probably come out stiff, and sore, and dull. An indiscreet horse-keeper thinks all these conditions are of little importance, and

that a continuance at the same labour will remove them; but this is rarely ever so. If an equally severe exertion is re-exacted for several succeeding days the appetite diminishes, the horse loses flesh, and should no acute disease supervene, he will almost certainly gradually become unfitted for work, and have to be entirely rested or his labour eased, the probable result being that he will never regain his natural standard of vigour and strength. By gradually inuring him, on the other hand, to his new occupation, increasing it in severity from week to week, the horse will ultimately acquire greater capability for endurance and strength than he ever before possessed.

It is a matter of surprise how widely practical men differ in opinion upon the amount of work a horse of average strength is able to perform. Such diversity is probably attributable to several causes. Firstly. No equally important subject appertaining to the management of draught-horses seems to have engaged so little attention from farmers and team-owners. Secondly. Hastily formed and dogmatically expressed opinions are often based solely upon the quantity of work that can be accomplished under one set of conditions, no latitude being allowed for the numerous circumstances which may and do entirely alter results. Thirdly. When the subject of horse-work forms the theme of discussion, the general tendency is to relate instances of the possession of more than ordinary powers of endurance possessed by certain animals, the result of whose capabilities may be invariably taken as exceptions rather than examples of what should constitute a fair day's work. Fourthly. Work is estimated sometimes by the number of hours employed, often by the distance travelled; and again by the weight transported, or the resistance overcome: the two latter items only should be considered, but they must be taken collectively when an estimate is made—the time occupied in the work, as will be subsequently shown, is to be regarded as an influencing condition, and one of the utmost importance.

The circumstances which conduce to variations in the results of horse-work are so numerous that it is impracticable to deal with

them in detail; they will, however, become evident to every experienced owner when his individual requirements are reviewed.

'It's the pace that kills' is the proverb of the hunting man, race-horse owner, and four-in-hand coachman, and although not generally so considered, the aphorism is equally applicable to farm and road teams. It may be accepted as a fact that in proportion as pace is increased, so must the hours of labour and the weight to be moved be decreased. From tables of calculation founded upon experiment it has been ascertained that the greatest advantage in the employment of horse-power is obtained when the hours of labour are increased and the pace correspondingly diminished. My personal observations tend to prove the correctness of the above statement, and I am entirely opposed to the view expressed by an eminent railway authority (Tredgold), who considers that the amount of work ordinarily accomplished in eight hours may frequently be performed in six hours with advantage to the horses. Draught horses can work long hours, and draw very heavy loads if they are not over-paced, but to demand from them quick movement, in order that a day's work may be completed at an early hour, will, if continued from day to day, materially shorten their periods of useful existence. In illustration, I submit the following problem, with its solution in two different ways. It is required as the daily work of two pairs of horses, equal in every particular to transport twenty-four tons of merchandise a distance of two miles from a given place. The one pair is occupied only six hours in drawing three four-ton loads, and returning with the lightened dray. The other pair, similarly loaded, is two or three hours longer doing the same distance. The effects of the two arrangements will become perceptible in a few months. Although the first pair will rest in the stable at least two hours of the twenty-four more than the second pair, the latter will exhibit less fatigue, maintain better condition, and wear the longest. I hold a strong opinion that the individual qualifications of each animal must be taken into account, and that if his natural pace is three miles an hour he may, if not over-loaded, be permitted to cover his fourteen or sixteen

miles in from five to six hours; but to force a horse whose natural pace is only two or two and a half miles an hour to accomplish the distance in the same time, is a certain means of very greatly abridging his life; whilst if allowed to work for ten hours if necessary he will last as long and probably longer than his more active companion, and be maintained in better condition upon a smaller allowance of food.

In the organization of team labour it is essential to appreciate the natural paces of the individual animals, and yoke them in accordance therewith. When such a course is impracticable, the working speed should be adjusted to the qualification of the slower horse.

Although of less important account than pace, the distance travelled for a day's work will materially affect condition. Assuming that the time occupied by two pairs of horses in transporting twenty-four tons two miles be equal, but that the teams differ in strength and activity, pair No. 1, taking four three-ton loads, would be more fatigued, less easily conserve condition, and be sooner worn out, than the slower-moving but stronger No. 2, with their four-ton burdens, but diminished mileage.

In an equal degree with under-feeding, long-continued *overwork*, whether caused by excessively long hours, overloading, or over-pacing, is the reverse of true economy; it cannot fail to be attended with deterioration of physical strength and health; at first slowly, gradually, but very surely, it reduces the power, and consequently the value of the animals, and when pushed beyond a certain limit it rapidly and irreparably shortens their lives of usefulness.

Horses employed upon any kind of work are benefited by periodical intervals of thirty minutes' duration in each four hours for rest, when they may partake of a little food from a nose-bag. To work them, and withhold their provender for a longer period than six hours, is inconsistent with a proper appreciation of the functions of their digestive organs.

If requested to furnish an example or type of a fair day's labour, suited to the powers of average farm horses, and one that

could be continued daily throughout the year, without causing loss of condition, on a 16 lb. corn ration, I should instance the ploughing of an acre of land of average strength in furrows of 9 inches width, the numerical strength of the team proportioned to the resistance opposed by the nature of the soil, the depth of the furrow, and the gradients of the field. The distance to be travelled would not exceed 12 miles, the pace slightly over $1\frac{1}{2}$ mile per hour.

The urgency which exists for the prompt completion of many farming operations necessitates the exaction of more severe and continued labour from the teams at certain seasons than would be consistent with the maintenance of good condition, vigour, and health, if prosecuted daily throughout the year. When an excessive, but temporary, increase of team-work must be undertaken, the owner in arranging his operations will do well to fully appreciate the effects of pace, mileage, hours of service, and food supply.

Rest.

To a hard-working-horse repose is almost as much a necessity as good food; but tired though he may be, he is often very shy to lie down even when a clean bed has been provided for him. Unless a horse lies down regularly his rest is never complete and his joints and sinews stiffen, and whilst it is true that some horses that sleep in a standing position continue to work for many years, it is equally true that they would wear much longer and perform their work much better if they rested naturally. Young nervous horses not unfrequently refuse to lie down when first made to occupy a stall, and, when introduced into a town stable, the habit may become confirmed, unless inducements are offered to overcome the disinclination. Should the provision of a plentiful sweet and clean straw bed in the stall not prove sufficiently seductive, the horse should, whenever such a course is practicable, be lodged in a well-littered and quiet loose-box every night, until he has become accustomed to his new work, companions and surroundings. When an older horse—one that has been for some years an occupant of a stall, and in the habit of taking his rest naturally—refuses to lie down, it may be suspected

that he has sustained some injury, probably very slight, to his spine, or that the commencement of some disease in his hocks warns him that he will experience some difficulty in rising. If the temporary sojourn in a loose-box does not induce a horse so circumstanced to resume his former practice, provision should be made for supporting him in his stall by means of slings during the time he is stabled; if the construction of the building or its fittings renders the application of slings impracticable, a substitute may be improvised by stretching loosely across the stall a broad and strong leathern belt, securely attached to each heel-post; the horse will quickly learn the use of this appendage, and reclining therein will be enabled to obtain some support, rest, and sleep.

It is essential that horses should enjoy rest as complete as possible during the hours it is permitted; they should not therefore be disturbed by persons working in, or even entering, the stable at those times; the entry or exit of horses to or from work, or the noise of the shoeing forge, should be particularly avoided. When teams are working on different 'shifts,' the stable arrangements should as far as practicable be such as will prevent disturbance to the resting horses.

Bedding.—The lavish use of bedding in the farm stables of localities where the sale of straw is prohibited by conditions of tenancy, or where distance from a market is an obstacle to its profitable disposal, cannot be regarded exactly in the light of extravagance. The farmer requires manure, and loses no opportunity of converting his straw into manure by every available means. The case is entirely different with farmers who are allowed to sell their straw, and are located within easy reach of a market; the straw they sell forms a very considerable portion of the proceeds of their corn crops, and so circumstanced they can generally purchase manure from the buyers of their straw. To owners of teams working in towns, who frequently have to pay a high price for the straw they require, the cost and consequently the consumption of litter is of considerable importance. Whatever the value of the article may be, a parsimonious use of bedding for cart horses is not economical. No practical man will be disposed to

underrate the evils that result to horses which from any cause refuse to lie down, and therefore every inducement for them to take natural repose should be provided. A plentiful, clean and well-arranged bed of sweet dry straw is certainly one of the greatest obtainable inducements to that desirable end. Wheat-straw being tougher and more easily spread than other kinds, is the best adapted for bedding purposes. It should be unbruised, dry, clean, sweet, bright in colour, and not have broad flaggy leaves. The length of wheat-straw renders its use apparently extravagant, as it frequently becomes soiled at one end only, to obviate this, each sheaf may be cut in two halves before being used. Where sufficient yard-space is available, it is economical for the owners of town horses to separate the long and only slightly soiled litter from the manure and worn straw, and in fine weather to spread it exposed to sun and wind to dry for second use. With care a horse may be provided with a good wheat-straw bed for an average consumption of not exceeding 10 lb. per day. Other descriptions of straw are softer, less durable, and generally more extravagant to use. Sometimes hay of too inferior quality to be consumed as provender is utilized as litter. This practice is a most objectionable one ; a sweet comfortable bed cannot be made of bad hay, and if its use be continued for a length of time, the horses will become infested with lice. The use of sawdust for town horses has of late years become common, but I cannot subscribe myself an advocate for its employment, except in association with straw, and under special conditions. A sawdust bed is not liked by cart horses ; at its best it is comfortless and uninviting, and should only be introduced into undrained stables provided with boarded floors; it may, however, be adopted with advantage for gross-feeding horses, prone to gorge themselves with straw supplied to them for litter. The objections to sawdust do not apply where it is used as a cushion to be interposed between stone floors and the straw, where, in fact, it bears the same relation to straw as a mattress to a feather-bed ; so arranged, I regard it as economical in saving straw, and also an absolute benefit and comfort to the horse.

Sale.

Some years ago the custom of preparing horses for sale was much more common than it fortunately is now. A Lincolnshire farmer could rarely be persuaded to offer his horses at the Lincoln April fair until they had been prepared for sale.

The preparation, as it was called, consisted in isolating the horse in a darkened loose-box, allowing no exercise, and supplying an unsparing quantity of food, calculated to produce fat—linseed-cake, treacle, and new milk constituting a considerable proportion of the diet. As may be imagined, the result of such treatment made the horse totally unqualified for work, and well fitted for the reception of disease, almost certain to result, from the altered conditions of management to which he would be submitted by change of ownership. The present buyers of horses for commercial purposes prefer an animal in working condition; for if disease does not reduce an over-fat horse recently brought from country to town below his natural size, the first object is to take off the superfluous flesh, which the farmer has incurred so much risk and expense in putting on; and subsequently to lay the foundation of hard muscle, by suitable food and a due amount of work.

The most rational system of preparation for sale is for the farmer to feed his horse substantially for some weeks, and apportion his work so that an increase in growth of frame is gradually and stoutly effected. By such a course the seller, buyer, and horse are each benefited; the seller, by making the horse earn his food, and at a minimum of risk; the buyer, by acquiring an animal ready for his immediate use; and the horse, by being maintained in condition proper for the conservation of his health and power.

The Treatment of Sick Horses.

Probably some disappointment will arise when it is found that this essay does not treat even briefly of some of the more common and easily managed diseases to which cart horses are liable, and that it does not contain prescriptions of medicines to be administered in such cases as owners are accustomed to undertake.

Whilst appreciating to the fullest extent the necessity of making my pamphlet as acceptable as possible to the general reader, I have come to the conclusion that the consideration of even the most trivial complaints must be passed over for the following cogent reasons. Firstly, as a veterinary surgeon, it would be impossible for me to enter upon subjects relating to the cure of animal diseases except in an exhaustive, and as far as my abilities permit, in a technical and scientific manner, and it is quite clear the space at my disposal prohibits this being accomplished either with justice to myself or the matter to be treated of; secondly, I regard the treatment of even apparently simple diseases by owners and amateurs as the reverse of economical, for experience not unfrequently proves that some of the most remunerative cases for veterinary surgeons, and many of the most disastrous ones to horse proprietors, have indirectly resulted from the use of drugs, balls and drenches purchased from druggists and the vendors of cattle medicines. It is not that the medicines purchased from such tradesmen are of themselves injurious, but the evil consequences arise in the great majority of instances from the delay occasioned by a feeling of partial security on the part of the owner, who waits to see the effect of the ball or drench he has administered before he calls in the aid of a professional man, and thus time of incalculable value is lost and all hope of saving the patient extinguished. Second in degree to the danger of delay is the difficulty in which the veterinary surgeon is placed who is summoned to treat an animal that has already been dosed with medicines which are unknown to him. His efforts are crippled by the fear of prescribing remedies that may be rendered inoperative by the medicines previously given, or he may hesitate to order a line of treatment which might possibly prove dangerous to the patient, by producing excessive operation, when associated with empirical measures that may or may not have contained agents of similar therapeutic action. I have felt some diffidence in blaming so strongly the practice of giving specific drugs lest my reasons should be misconstrued; but if the thoughtful reader will reflect for a few moments, he will probably agree with me that it is

impossible for anyone who has not been specially educated, and whose judgment has not been matured by extended practice, to distinguish between the primary symptoms of simple ailments and those that usher in the most dangerous maladies. This being conceded, is it not strange that owners possess sufficient confidence to jeopardize the lives of their valuable animals by the administration of remedies which will cure a simple ailment (that would in all probability subside without any treatment), but which remedies are absolutely powerless to combat a formidable disease?

Fortunately for animals as well as their masters, the progress of veterinary science has during the last twenty years advanced with strides almost as rapid as those made by the medical profession. In these days horses, when treated by properly educated and experienced men, are not drugged to death. Greater attention is paid to the study of the causation, progress, and nature of disease, than to the administration of medicines which in days gone by were solely relied upon to ameliorate the symptoms presented by the patients. Suffering animals are now placed in conditions calculated to preserve their vital powers to the utmost limit, and encouragement is afforded for the fullest display of those grand natural laws which, so long as life lasts, are in never-ceasing operation to combat the fatal effects of disease.

I am entirely opposed to the practice—common in some establishments—of giving various kinds of medicine at periodical and often at short intervals 'to keep the horses healthy.' Healthy horses do not require physic, and where its administration is not beneficial it must be injurious. The drugs chiefly used are glandular excitants; their action is manifested by an increased secretion of the stimulated organ, and repetitions of the dose frequently end by producing permanent disease of the overworked part. A judicious change of food, efficient stable management, and proper arrangements for work can accomplish all that is necessary for the conservation of health in sound horses in a better and safer manner than the exhibition of medicaments.

A considerable number of horses are prone to experience

derangement of their urinary organs on taking slight cold and from other trivial causes. In such cases the animal is commonly dosed time after time with nitre in some form or other, which unfortunately relieves the urgent symptoms at the cost of weakening the secretive power of the kidneys to an extent that, when some acute and formidable disease is contracted, those emunctories fail to perform their share in ridding the system of material which is detrimental to health, and recovery from such an attack is thereby retarded, if not rendered absolutely impossible.

In the treatment of disease good nursing is to be regarded as equal to skilful medical attention. Without the former, the latter can avail but little; to achieve more than an average amount of success, both must be applied in parallel lines. Those men who have an intuitive love for dumb animals, who are conversant with their habits in health, and who are born with acute perceptive faculties, can be most readily educated into efficient attendants upon sick horses. Without these inborn faculties, no one can become proficient; but the possession of them alone will not suffice, unless they are allied to other habits and *quasi* talents which are to be acquired or strengthened by experience and the exercise of zeal. A good nurse must be in every sense a horseman; he must be patient, persevering, resolute, cheerful, careful, quiet, and self-possessed, yet prompt to think and act; he should cultivate habits of close observation and obedience to instruction, and be thoroughly reliable; he must know how to administer medicines in all forms, and be able to apply all requisites used in ordinary treatment for the comfort and well-being of the patient. The qualifications I have enumerated as essentials are rarely found combined in one man, and fortunate is the extensive horse-proprietor who has a servant possessing them. Any instructions that can be offered for the guidance of such a man are superfluous, for he already knows more than written hints of limited extent can teach; but as such men are rarely to be met with, the few suggestions I am about to make may possibly assist those who possess natural talents in this direction to more quickly

become efficient in the details of their calling. It is particularly to be noted that the brief remarks on nursing herein contained are in no way to be considered as unalterable, but are to be subordinated to the more imperative instructions given from time to time by the professional adviser in any case under treatment; for not only must individual differences in animal constitutions be studied, but it is to be remembered that the requirements for the stable management of sick horses are necessarily as varied as are the diseases themselves.

One of the duties of an attendant upon a sick horse being to see him placed in conditions that are best fitted to allow all those natural agencies which act as restoratives to health to exert their full influence, the prompt removal of the patient to a roomy, well-paved and light loose-box is the first in importance. In the treatment of many severe equine diseases, a supply of pure air is an indispensable necessity, and one to which the hospital nurse's attention ought to be primarily directed. An atmosphere of sufficient purity can only be secured in situations removed from decomposing animal or vegetable matter, by the provision of well-arranged apertures for ventilation, and a constant supervision that the functions of such openings are effectually performed, together with the maintenance of perfect cleanliness of the litter and clothing as well as of the floors, walls, and fittings of the sick-box. It is always desirable, and frequently important, to keep the atmosphere of the hospital at an uniform temperature, a requirement that unfortunately during cold weather is difficult of attainment. The degree of warmth to be maintained will vary with the nature of the disease by which the patient is attacked, some affections being benefited by the influence of a higher and some by that of a lower degree of heat. In all bronchial and in most chest diseases, it is necessary to give due consideration to the difference between the temperature of the stable in which the horse is living and that of the box to which he is to be removed for treatment. If in the stable he has been respiring an air of some seventy degrees, it would be most injudicious to expose him for more than a few minutes to a raw, rasping atmosphere of say

under forty degrees. Should such conditions exist, the preparation of the loose-box for the reception of the patient should be commenced by warming it with a coke-fire, having the ventilators nearly closed, so that the change to a cooler atmosphere may be gradually effected.

When unrestrained the position a horse assumes will indicate whether light or shade is the more agreeable to him, and as it may be generally accepted that whatever tends to the comfort of an animal suffering from disease is beneficial, the information thus afforded should not be disregarded by his attendant. In the absence of indications to the contrary, I am as strong an advocate for the free admission of sunlight into the sick-box, except during periods of extreme heat, as I am opposed to the maintenance of artificial light at any season of the year. Moderate solar light and warmth are important factors for promoting a restoration to health in patients attacked with low fevers, and are especial aids during convalescence from all forms of depressing maladies.

As there are cases in which abstention from food becomes a necessity, so there are others in which every means, including forcible administration, must be employed to secure the introduction of sufficient nutriment into the patient to sustain his vital powers over a crisis of disease. It is not to be expected that the stable attendant will be able to discriminate between the two extremes; hence the necessity arises for the food supply of animals suffering from dangerous diseases being prescribed by the medical attendant, whose directions are to be strictly adhered to by the hospital nurse. In the absence of instructions to the contrary, the food allowance for sick horses may be governed by the patient's appetite; but in low, depressing fevers, and during protracted convalescence, it is not only necessary to supply an easily digested and palatable diet, but also one rich in nutritive principles. The food should always be specially prepared and given in such a quantity only as the horse will consume at one meal; it is better to provide too little than too much, and any portion remaining after the patient has ceased to relish his repast should be promptly removed. 'Little and often' is a very good motto to observe in

reference to the food supply of sick horses, but the 'often' requires qualification; when little or no inclination to eat exists, food should only be offered at intervals of considerable length, and ought never to be left within the patient's sight or reach; too frequent solicitation interferes with the obtainment of repose, which in critical cases is of the utmost importance, and the continued presence of food creates a feeling of nausea sufficient to protract the advent of a natural appetite.

During the acute stages of almost all diseases, cold or slightly tepid water is the most agreeable as well as the most beneficial drink. Except in a few special cases it may be given in sufficient quantity to assuage thirst, and it should be offered once in every four hours—a practice preferable to that of leaving the pail within the sick-box, for the animal to drink at will. In the secondary stages of debilitating maladies and during convalescence, the drinking-water forms a most valuable vehicle for the passive introduction of soups, milk, ale, alcoholic stimulants, nutritious meals, or infusions needful for restoring physical strength.

It must be conceded that rest for a diseased organ is one of the most potent factors for its restoration, and also that general tranquillity is equally important as a conservator of vital power; it is therefore impossible to overrate the value of repose in the treatment of all severe disorders. It is not intended to imply that when suffering from a dangerous illness the patient is to be left alone for many hours shut up within the four walls of his box, but rather that he should be spared unnecessary disturbance from meddlesome intrusion. The practice of visiting a patient every hour or two 'just to see how he going on,' is a reprehensible one. Several times during the day, and perhaps once or twice in the night, it is requisite that his wants should be supplied; but the visits of his attendant ought to be regulated both in frequency and duration by the amount of attention actually necessary. Except during very cold or windy weather the upper door of the box should be open in the day-time, that the patient may be able to see what is going on outside; he will possibly take some interest in his surroundings, and will be able to understand that there is

something left to live for, but in the night-time he should be allowed to enjoy absolute repose.

Sick horses are peculiarly sensitive to impressions of voice and manner; they ought never to be harshly spoken to nor roughly treated. The demeanour of the attendant should be especially cheerful and kind; he should never exhibit a belief in, indeed he ought not to feel the hopelessness of his charge's condition. The natural repugnance of healthy horses to offensive tastes and smells becomes intensified by sickness; it is therefore necessary that more than ordinary attention should be given to secure a perfect condition of cleanliness in the most minute detail of their hospital surroundings.

It is not desirable for a sick horse to be submitted to the usual routine of daily grooming, but he will feel greatly refreshed by having his face, eyes, and nostrils sponged with tepid water and afterwards thoroughly dried morning and evening, and his condition will be benefited by an occasional hand-rubbing of his ears and legs when they become chilled. The use of stable-clothing is essential for the treatment of diseases in which there is a tendency to coldness of the extremities and surface of the body generally, symptoms usually produced by a disturbance in the equality of the circulation of the blood. A hood for the head and neck, one or more body-sheets long enough to cover the quarters and to buckle over the breast, and bandages for the legs are requisite. All clothing should be made of light but warm woollen fabric, and applied in quantity equal to the requirements of the case and the season of the year, and should be so disposed as to cause no feeling of restraint or discomfort to the animal. The clothing should be kept thoroughly clean and be changed once in every twelve hours; the day and night suits in turn, on removal, should be well shaken, purified by exposure to the atmosphere, and warmed and dried before being reapplied.

In all diseases where acute pain is evinced by violence or rolling, and especially in some intestinal affections where the intensity of suffering produces almost uncontrollable frenzy, it is necessary to provide some protection against self-inflicted injury

by an abundant supply of straw bedding spread thickly over the floor, and packed along the walls of the box for several feet above the ground-level. In the majority of other severe and acute diseases there is generally an obstinate disinclination to lie down, and the movements of progression and turning are accomplished with difficulty and pain. In such cases sawdust or chaff litter is better than straw until convalescence is so far advanced as to warrant a probability that the animal will take his rest in a recumbent position. Where sawdust or chaff is unobtainable, the straw should be sparingly used and cut into short lengths so that the horse may move freely through the bed. The bedding, of whatever material composed, is to be maintained in a condition of cleanliness and dryness by the prompt and complete removal of any portion soiled by dung and urine, or which may have become damp from any other cause.

An important duty of the hospital nurse is to carry out the orders of the medical attendant, whose instructions should be implicitly obeyed with accuracy, regularity and punctuality. The administration of medicines must be conducted with quiet, patient, and careful resolution, and in strict accordance with received directions as to dose, time and form. He must closely observe the frequency, quantity and condition of the excretions, carefully note any change that may take place in the symptoms, and be able to give an accurate report of the general bearing of the patient. No change of apparently trivial signification should pass unnoticed, but all minor incidents ought to be faithfully stated. The stable attendant's attention is to be directed to all those little but essential details, the sum of which tend so greatly to mitigate the sufferings and to increase the comfort of his dumb and dependent charge.

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